EXHIBIT 1

May 2006

Resume

George T. Ligler

GTL ASSOCIATES
12400 BEALL MOUNTAIN LANE
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Education

Oxford University, Oxford, England
M.Sc., Computer Science, 1973
D. Phil., Computer Science, 1975
(Rhodes Scholarship)

Furman University, Greenville, South Carolina
B.S., Mathematics, 1971
Summa Cum Laude

Experience

December 1988 - Present: GTL ASSOCIATES
Potomac, Maryland

Proprietor

Established consulting firm in telecommunications, computer system engineering, and information management. Systems integration/engineering and product management services provided to thirty-five clients in the United States and Europe. Assignments have included telecommunications network design, product and service definition and management, consulting on major program management and the systems integration process, applications systems engineering, business process improvement, competitive analysis, red teaming of major proposals, representation of clients in international fora, support of patent licensing discussions, participation in litigation as an expert witness, and new business venture planning.

Experience

December 1984 - December 1988: COMPUTER SCIENCE CORPORATION, Falls Church, Virginia

Vice President, Systems Group, November 1987 - December 1988

Assignments on major program acquisition efforts within Systems Group, CSC's $750M/year Government business. Areas of involvement included pre-award project team preparation, proposal review and assistance, subcontractor selection and management, competitive analysis, and business acquisition process review.

Vice President & Executive Director, Consolidated Data Network, Systems Division, October 1986 - November 1987

Program Office responsibility for a $282 million, 8-year effort to provide, operate, and maintain packet-switched data network for the U.S. Treasury Department, with AT&T and BBN as major subcontractors. Put in place a network design and implementation infrastructure that achieved peak cutover rates of over 20 network locations per working day, enabling customer to transition to new expanded enforcement data system without major delay. Reduced CSC cost per site cutover by over 20%. Established material planning methodology (MRPII) to improve inventory management. Laid the groundwork for resolution of several important contractual issues. Recruited and developed successor program manager.

Vice President, Communications and Controls Products, Systems Division, December 1984 - October 1986

Responsible for a $12M/year business area engaged in the supply of Energy Management and Control Systems(EMCS) and communications subsystems for urban rapid transit systems. Expanded EMCS business from Tri-Service applications to commercial arena and made that business profitable. Responsible for the development of selected communication security products as value-added options for CSC's systems integration thrust.

Experience

March 1982 - December 1984. AYDIN CORPORATION, Fort Washington, Pennsylvania

President, Aydin Controls Division, March 1982 - December 1984.

Vice President, Aydin Corporation, February 1983 - December 1984.

General management responsibility for a 375-person, fully-integrated Division with annual sales of $27M of computer graphics equipment. Product lines in color raster scan display generators, high resolution monitors, and turnkey CAD/CAM systems. Market areas included process control, utilities, defense, and petrochemical resource exploration. Division growth 1981-1984 of approximately 45%, outperforming most graphics terminal competitors. Significant operational improvements boosted margins for investment in sales, marketing, and product development.

April 1980 - March 1982. BURROUGHS CORPORATION, Paoli, Pennsylvania.

Deputy Manager, Great Valley Labs, April 1980 - January 1981.

Deputy General Manager and Director of Engineering, Special Systems Division, Federal and Special Systems Group, January 1981 to March 1982

Chief technical executive for Special Systems Division precursor. Later responsible for 400 research and engineering personnel engaged in the development of primarily command/control/communications and secure systems. Research component of organization executing projects in diverse areas of computer science and engineering, including distributed processing, local area networks, software tools/engineering, VLSIC design, and machine intelligence. Remaining activities matrixed into Division programs for customers including NATO, NSA, Navy, Army, and FAA. Assist with general management of a $50M marketing, engineering, and manufacturing operation.

Experience

September 1976 - April 1980. TEXAS INSTRUMENTS, Dallas, Texas.

Project Manager, Research Manager.

Developed software products (e.g., compilers, programming tools) which became sources of TI revenue. Built an applied research and development activity of 15-20 persons with diverse program elements in computer systems and software engineering. Chaired a 25-member corporate-wide technical working group on advanced computer architectures; member of corporate computer science thrust team.

September 1975 - September 1976. UNIVERSITY OF TEXAS AT SAN ANTONIO, San Antonio, Texas.

Assistant Professor of Computer Science

Taught graduate/undergraduate courses in programming languages and analysis of algorithms. Research and publication in software engineering and programming language design. Chairman, Division Faculty Recruiting Committee.

Professional Activities

Author or co-author of twenty technical papers in the areas of software engineering, telecommunications, computer and computer systems architecture, navigation and information systems for aviation, and computer graphics.

Member, Association of American Rhodes Scholars, ACM, ION. Senior Member, IEEE.

Director, American Trust for Wolfson College, Oxford.

Numerous invited lectures, panels, and program committee memberships.

Adjunct faculty member (two dissertation committees), Union Institute, 1989-1993.

Recipient of Furman University's highest alumni award, 1979.

Member of National Research Council's Committee on Review of the Information Systems Modernization of the Internal Revenue Service, 1990-1995.

Member of Technical Review Committee for Georgia Institute of Technology's Futurenet, which formed the backbone for telecommunications within the 1996 Olympic Village, 1994-1996.

Member, Program Management Committee, RTCA (Aviation Standards Federal Advisory Committee), August 2000 to present. Co-Chair of RTCA's Special Committee on Satellite Navigation, June 2005 to present.

Member of National Research Council's Panel on Research on Future Census Methods, December 2000 to March 2004.

EXHIBIT 2

United States Patent [19]

Inuiya et al.

[11] **4,152,722**

[45] **May 1, 1979**

[54] **RETRIEVAL SYSTEM**

[75] Inventors: **Masafumi Inuiya, Asaka; Hiroyuki Ueda, Tokyo, both of Japan**

[73] Assignee: **Fuji Photo Film Co., Ltd., Minami-ashigara, Japan**

[21] Appl. No.: **872,212**

[22] Filed: **Jan. 25, 1978**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 669,915, Mar. 24, 1976, abandoned.

[30] **Foreign Application Priority Data**

Mar. 24, 1975 [JP] Japan 50-35942

[51] **Int. Cl.**[2] **H04N 7/18; G03B 23/08**

[52] **U.S. Cl.** ..... **358/102; 353/27 A; 358/93; 358/210**

[58] **Field of Search** ..... 358/102, 93, 104, 210; 353/26 K, 27 R, 27 A

[56] **References Cited**

U.S. PATENT DOCUMENTS

3,697,680	10/1972	Anstin	358/102
3,749,830	7/1973	Blitchington	358/101
3,870,814	3/1975	Woods	358/102

Primary Examiner—Howard W. Britton
Attorney, Agent, or Firm—Fleit & Jacobson

[57] **ABSTRACT**

A recording medium such as a microfiche bearing graphic information like a map in a reduced scale is provided in a retrieval unit including an optical projection system connected with a television type display device. The recording medium is moved with respect to the optical projection system by an X-Y moving device which is operated by an electric position signal. The electric position signal is given by a position detecting device. The position detecting device has a graphic information similar to that recorded in the recording medium and a detecting pen to point a desired spot on the graphic information and a joy stick to give the position signal to the X-Y moving device.

8 Claims, 6 Drawing Figures

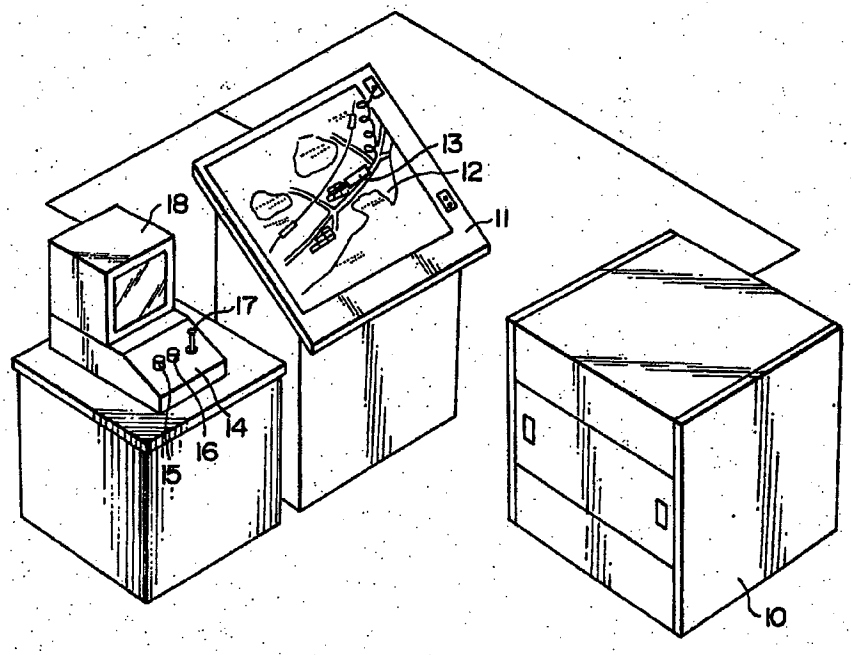


FIG. 1

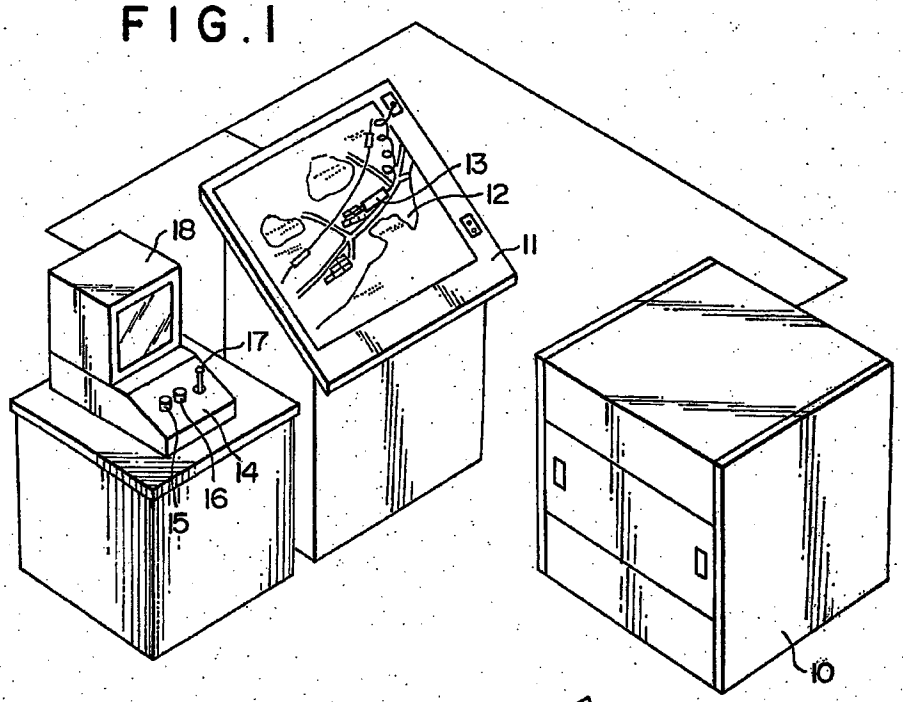


FIG. 3

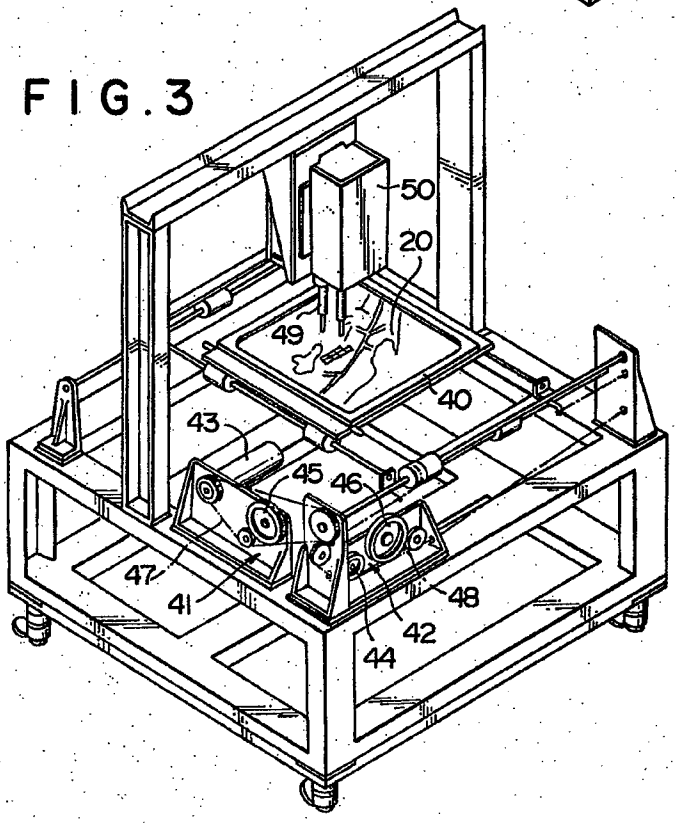


FIG. 2

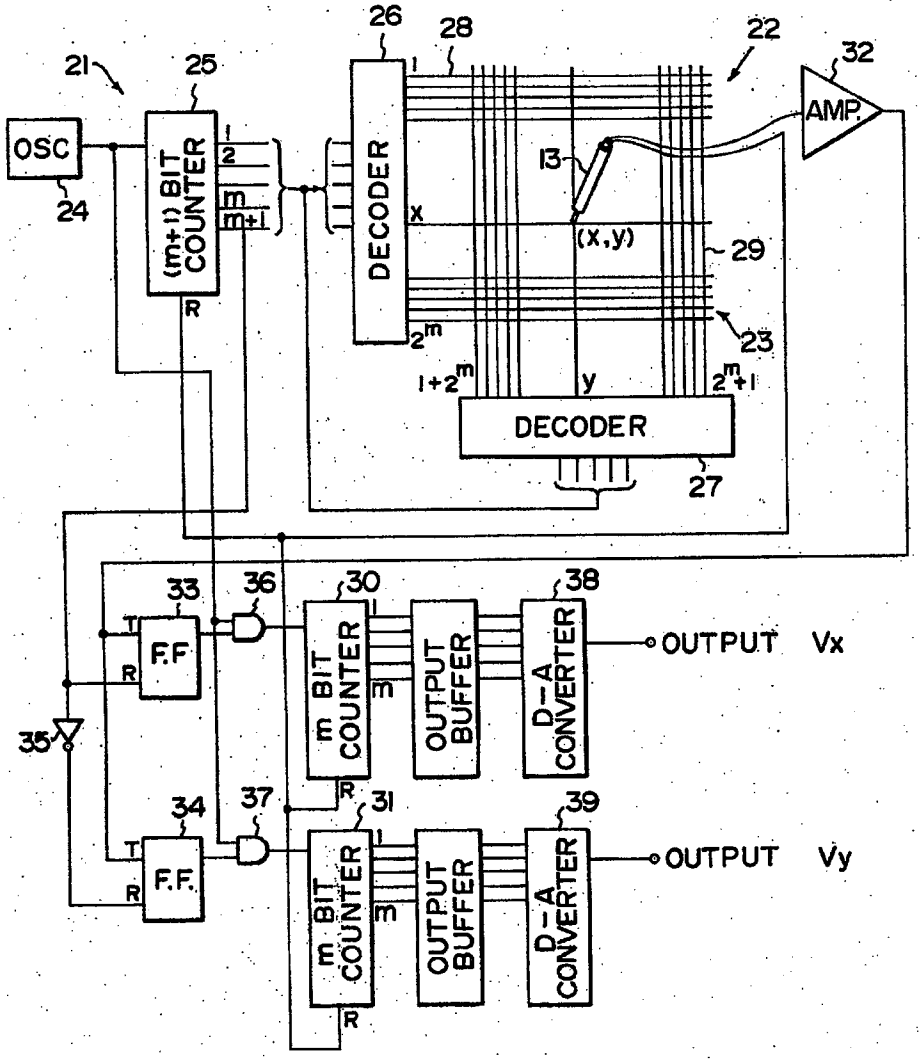

21
25
26
28
22
32
OSC
24
(m+1) BIT COUNTER
DECODER
AMP.
13
(x,y)
29
23
DECODER
27
33
36
30
38
F.F
m BIT COUNTER
OUTPUT BUFFER
D-A CONVERTER
OUTPUT Vx
35
34
37
31
39
F.F.
m BIT COUNTER
OUTPUT BUFFER
D-A CONVERTER
OUTPUT Vy

FIG. 4

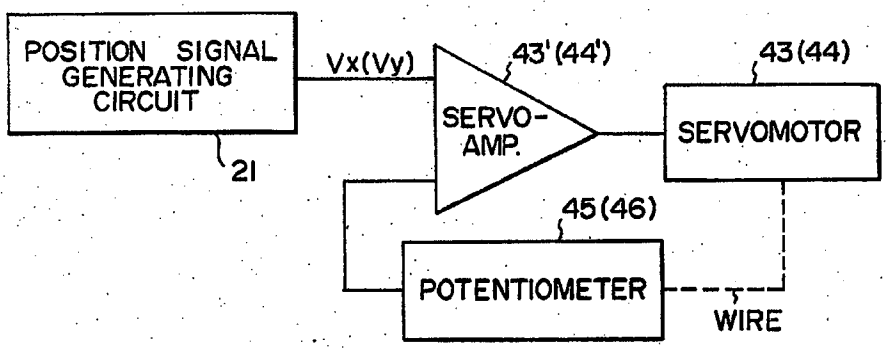


FIG. 5

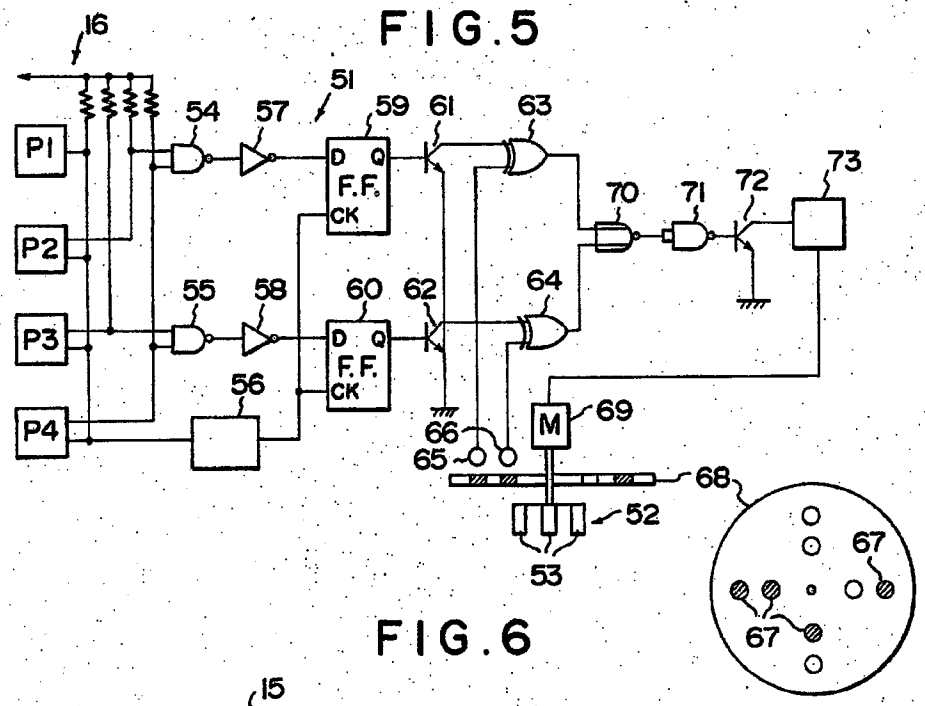
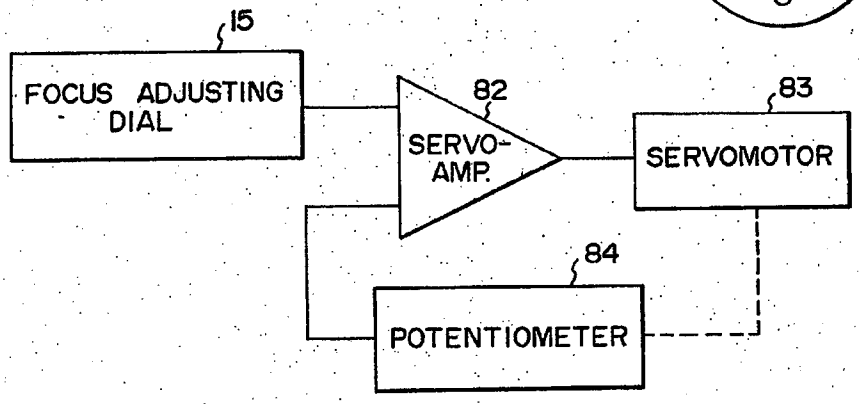


FIG. 6



RETRIEVAL SYSTEM

This application is a continuation-in-part of Ser. No. 669,915, filed Mar. 24, 1976, now abandoned.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a graphic information retrieval system, and more particularly to a system for retrieving a part of a graphic information such as a map recorded on a recording medium in reduced scale and displaying the retrieved part thereof in a display device in enlarged scale.

2. Description of the Prior Art

Drawings or figures bearing two dimensionally extending graphic information such as maps, circuit diagrams, piping plans and other kind of plans like blueprints are usually divided into several pages to facilitate the handling thereof. One of this kind of information divided into a number of pages is an atlas. The atlas includes a map of small reduction ratio in addition to a number of detailed maps of comparatively large reduction ratio so that a desired detailed map can easily be found. In a microfilm system, a map is divided into several image frames of a microfilm. Therefore, in practical use of the atlas or the microfilm map viewing system, it is necessary to turn the pages or to feed the frames several times to find a desired spot in the map. It is possible to connect a computer to a microfilm reading system to perform a direct retrieval of a spot of the map. However, this will need a great capacity of memory, which results in a great increase in the cost. Further, it is often desired to see a map along a road extending over several pages. In such a case, it takes a long time and needs a troublesome turning of the pages or feeding of the frames to see the map as desired.

Particularly in case of emergency in a police office, for instance, finding a spot on a map upon receipt of an emergency phone or the like, it is often desired to guide a squad car to the spot by viewing a road map. In other emergency works such as fire services, gas, water and electricity services also, it is required to quickly find the spot concerned.

SUMMARY OF THE INVENTION

The primary object of the present invention is to provie a graphic information retrieval system in which a spot on the graphic information such as a map or the like can be found easily and quickly.

Another object of the present invention is to provide a graphic information retrieval system in which the graphic information such as a map or the like can be displayed with various reduction ratios.

Still another object of the present invention is to provide a graphic information retrieval system in which a spot of the graphic information displayed can be varied continuously.

A further object of the present invention is to provide a graphic information retrieval system in which a spot of the graphic information such as a map or the like can be retrieved continuously along a line such as a road in a map.

The system in accordance with the present invention is characterized in that a figure which is similar to a figure recorded in reduced scale on a recording medium and displayed in enlarged scale on a display device is used for retrieving a spot in the figure. The system of this invention is applied to a figure retrieval system in which an information recording medium bearing an image of a map or the like in reduced scale is supported by and moved in X and Y directions by a holder and the image on the recording medium is displayed in enlarged scale on a display device. By moving the recording medium in the X and Y directions, various parts of the image are displayed. The movement of the holder is controlled by an electric control means. In accordance with the present invention, a figure such as a map which is similar to the image recorded in the recording medium is provided beside the microfilm reader, and a position detecting means is used in combination therewith to operate said electric control means. The position detecting means includes for instance a detecting pen which has a function to generate a position signal when it is used to point a position in said figure.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view showing an example of a map retrieval system emmbodying the system in accordance with the present invention,

FIG. 2 shows an example of the position signal generating circuit used in the map retrieval system shown in FIG. 1,

FIG. 3 is a perspective view showing the internal structure of a super-microfiche retrieval unit employed in the map retrieval system shown in FIG. 1,

FIG. 4 is a block diagram which shows an example of the X-Y moving means used in the map retrieval system shown in FIG. 1,

FIG. 5 shows an example of the lens selection circuit used in the map retrieval system shown in FIG. 1, and

FIG. 6 is a block diagram which shows an example of the focus adjusting circuit used in the map retrieval system shown FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

An example of a retrieval system which embodies this invention is shown in FIG. 1. This system comprises a super-microfiche retrieval unit 10, a position detecting device 11, an operation table 14, and a television monitor 18.

The position detecting device 11 is provided with a map 12 for instance of a town in which rough information such as streets, areas and stations with the name thereof is shown. For example, the map 12 is on a scale of one to fifty thousand.

The super-microfiche retrieval unit includes a super-microfiche 20 (FIG. 2) which bears a detailed map of the town showing individual houses, buildings with the name thereof and other detailed information. The super-microfiche 20 consists of a number of microfiche elements on each of which a corresponding part of a map on a scale of one to one thousand is recorded in a reduced scale of one hundredth. The prepared microfiche elements are connected with each other to constitute the microfiche 20.

The super-microfiche retrieval unit 10 generates an output for displaying detailed information of a part of the map according to a position signal given thereto by the position detecting device 11. When a position signal which represents a certain spot of the map 12 is given to the super-microfiche retrieval unit 10, the unit 10 gives an output which effects to display a detailed map of said certain spot of the map 12. The unit 10 includes an image pick-up tube and an optical projection system for

focusing an image of the map on the tube. The map is moved relative to the tube according to the position signal given thereto.

The position detecting device **11** will be described in detail with reference to FIG. **2**.

The position detecting device **11** comprises the map **12**, a position signal generating circuit **21** having a tablet **22**, and a detecting pen **13** which cooperates with the circuit **21** to generate a position signal. The map **12** is supported on the tablet **22**. The tablet **22** includes multipolar stylus electrodes **23** arranged in the form of a lattice. The multiple electrodes comprises X-direction electrodes **28** and Y-direction electrodes **29**. An oscillator **24** supplies clock pulses to a binary counter **25**, in which the clock pulses is divided. Decoders **26** and **27** are connected between the counter **25** and the X-direction electrodes and the Y-direction electrodes, respectively. The decoders **26** and **27** receive the divided clock pulses from the counter **25** and supply pulses to the X-direction electrodes **28** and Y-direction electrodes **29** progressively.

One output of the detecting pen **13** is connected with the reset terminal R of the counters **25** and reset terminals R of binary counters **30** and **31**. When the tip of the detecting pen **13** is depressed in response to action of the pen **13** to point at a portion of the map **12**, the pen **13** supplies a reset release signal to the reset terminals R of the counters **25**, **30** and **31**.

The other output of the detecting pen **13** is connected with the input of an amplifier **32** the output of which is connected with trigger terminals T of flip-flops **33** and **34**. A reset terminal R of the flip-flop **33** is connected with the output No. m+1 of the counter **25**. A reset terminal R of the flip-flop **34** is connected with the output No. m+1 of the counter **25** via an inverter **35**. The outputs of the flip-flops **33** and **34** are connected with one input of AND gates **36** and **37**, respectively. The other input of each of the AND gates **36** and **37** is connected with the oscillator **24**.

Assuming that the pen **13** points at a position (x, y) on the tablet **22**, the operation of the position signal generating circuit **21** will be as follows.

When the tip of the detecting pen **13** is depressed, the detecting pen **13** supplies a reset release signal to the counters **25**, **30** and **31**. The counter **25** therefore starts counting the pulses from the oscillator **24**. The decoder **26** and **27** receive the outputs of the counter **25** and cause the pulses corresponding to the outputs to scan the X-direction and Y-direction electrodes **28** and **29**. The outputs of No. 1 to No. m are supplied to the decoder **26** and the outputs of No. m+1 to No. 2m+1 are supplied to the decoder **27**.

When the counter **25** supplies the outputs to the decoder **26**, the output of No. m+1 is 0, and accordingly the reset terminal R of the flip-flop **33** receives OFF signal. While, the OFF signal is changed to ON signal by the inverter **35** and is supplied to the reset terminal R of the flip-flop **34**.

When a pulse is supplied to the electrode No. x of the X-direction electrodes, the detecting pen **13** detects the pulse and the amplifier **32** supplies a detect signal to the trigger terminals T of the flip-flops **33** and **34**. The output of the flip-flop **33** outputs ON signal to the one input of the AND gate **36**. Therefore, after the pen **13** detects the pulse on the electrode No. x, the pulses from the oscillator **24** pass the gate **36** and are supplied to the counter **30**. Since, when the output No. m+1 of the counter **25** outputs ON signal the reset terminal R of the flip-flop **33** turns ON, the output of the flip-flop **33** outputs OFF signal. Accordingly, the AND gate **36** does not give an output. Consequently, the counter **30** counts pulses up to (2^m-x). The output of the counter **30** is supplied to a digital-to-analogue converter **38**, which convert the digital output of (2^m-x) to an analogue voltage output Vx.

While, when the output No. m+1 of the counter **25** outputs ON signal, the reset terminal R of the flip-flop **34** receives OFF signal, and therefore the reset of the flip-flop **34** is released. In the same manner as in the case of output Vx, a digital-to-analogue converter **39** outputs a voltage output Vy.

Thus, the position signal generating circuit **21** generates the position signal in the form of voltage (Vx, Vy) corresponding to the position (x, y) on the map **12**. The position signal (Vx, Vy) is supplied to the super-microfiche retrieval unit **10**.

The super-microfiche retrieval unit **10** will now be described in more detail with reference to FIG. **3**. The super-microfiche **20** bearing the detailed map is supported by a holder **40** which is moved in a horizontal plane by an X-Y moving means **41** and **42**. The X-Y moving means **41** and **42** are comprised of two servomotors **43**, **44**, potentiometers **45**, **46** and servoamplifiers **47**, **48** (FIG. **4**). The servomotors **43**, **44** are operatively connected with the holder **40** by means of wires **47**, **48**, respectively.

The servoamplifier **47** compares the position signal Vx from the position signal generating circuit **21** with the voltage of the potentiometer **45** to generate a signal of the difference therebetween. The servomotor **43** is rotated by the signal of the difference from the servoamplifier **43'**. The servomotor **43** rotates the potentiometer **44**. The servomotor stops when the voltage of the potentiometer **44** coincides with the position signal Vx. Accordingly, the microfiche **20** supported on the holder **40** is moved and positioned at an X-direction position in connection with the position signal Vx from the position signal generating circuit **21**. In the same manner, the microfiche **20** is moved and positioned at a Y-direction position in connection with the position signal Vy by a servomotor **44**, a potentiometer **46** and a servoamplifier **44'**.

When the positioning of the X-direction position and Y-direction position of the microfiche is performed, the central portion of the part of the microfiche **20** corresponding to the position (x, y) of the map **12** is brought into alignment with the optical axis of an optical projection system **49** (FIG. **3**) which is located above the microfiche **20**. On the operation table **14**, an image of the detected spot of the map **20** is displayed in the CRT of the television monitor **18** in enlarged scale. The operation table **14** is provided with a joy stick **17** for giving a position variating signal which comprises an X-direction component and a Y-direction component to be supplied to the X-Y moving means **41** and **42** to vary the position of the microfiche **20** in the super-microfiche retrieval unit **10**. This joy stick **17** is conventionally known as a means for giving a position varying signal in a graphic display device in a computer system. The output signal of the joy stick **17** (ΔVx, ΔVy) is added to the output signal of the position signal generating circuit **21** (Vx, Vy), and accordingly the total value (Vx + ΔVx, Vy + ΔVy) is put into the X-Y moving means **41** and **42** in the super-microfiche retrieval unit **10** for controlling the position of the super-microfiche **20**. Therefore, by moving the joy stick **17** back and forth

and from side to side, the part of the map displayed in the television monitor **18** varies accordingly.

The output projection system **49** includes an illumination light source, a condenser lens and a projection lenses for focusing an image of a part of the map recorded on the microfiche **20** on the face of an image pick-up tube of a television camera **50** to produce an output signal representing the part of the map projected on the image pick-up tube. The projection lens system may be comprised of a plurality of selectable lenses mounted on a lens turret to change the scale of the map to be displayed.

Referring to FIG. **5**, a lens selection circuit **51** to be used for a lens turret **52** having four selectable lenses **53** will hereinbelow be described.

A lens changing switch **16** (FIG. 1) is disposed on the operation table and is rotatable to take one of four positions P1, P2, P3 and P4 respectively corresponding to the four lenses **53**. When the switch **16** is placed at one of the positions P1, P2, P3 and P4, NAND gates **54** and **55** and a monostable multivibrator **56** receive signals from the switch **16**.

Assuming that the switch **16** is placed at the position P1, all of the inputs of the NAND gates **54** and **55** are "1," and accordingly the NAND gates **54** and **55** at the outputs are "0." The two signals "0" are inverted to "1" by means of inverters **57** and **58**, respectively. The signals "1" are supplied to inputs D of flip-flops **59** and **60**. While, inputs CK of the flip-flops **59** and **60** receive a clock pulse from the monostable multivibrator **56**. The flip-flops **59** and **60** output "1" at the terminals Q, and therefore transistors **61** and **62** are turned ON. Consequently, one input of each of exclusive OR gates **63** and **64** is "0." The other inputs of the exclusive OR gates **63** and **64** receive signals from Hall devices **65** and **66**. When the Hall devices **65** and **66** detect magnets **67** disposed on a code disc **68** in connection with the positions P1, P2, P3 and P4 of the switch **16**, the Hall devices supply a signal "0." The code disc **68** is coaxially connected with the turret **52** and the code disc **68** and the turret **52** are simultaneously rotated by a motor **69**.

For example, if the Hall device **65** detects the magnet on the code disc **68**, the Hall device **65** supplies a signal "0" to the other input of the exclusive OR gate **63**. Since the exclusive OR gate **63** at the one input is "0," the exclusive OR gate **63** at the output is "0." However, if the Hall device **66** does not detect the magnet, the Hall device **66** supplies a signal "1" to the other input of the exclusive OR gate **64**. Since the one input of the exclusive OR gate **64** is "0," the exclusive OR gate **64** at the output is "1."

The output of the exclusive OR gate **63** is connected with one input of a NOR gate **70**, and the output of the exclusive OR gate **64** is connected with the other input of the NOR gate. When, as mentioned above, the one input is "0" and the other input is "1," the NOR gate **70** at the output is "0." The signal "0" is inverted to "1" by a NAND gate **71**, and accordingly a transistor **72** turns ON. When the transistor **72** turns ON, a relay **73** causes the motor **69** to rotate. The motor **69** rotates the turret **52** with the code disc **68**.

If the Hall devices **65** and **66** detect the magnets as shown in FIG. **5**, the other input of each of the exclusive OR gates is "0." Accordingly, the exclusive OR gates **63** and **64** at the outputs are "0," and then the NOR gate **70** at the output is "1." The signal "1" is inverted to "0" by the NAND gate **71**. Therefore, the transistor **72** turns OFF thereby to stop the motor **69**. Thus, a lens **53** is selected.

A lens focus adjusting circuit is comprised of a focus adjusting dial **15** provided on the operation table **14**, a servoamplifier **82**, a servomotor **83** and a potentiometer **84**. The servoamplifier **82** compares a voltage output proportional to the rotation of the focus adjusting dial **15** with the voltage of the potentiometer **84** to output a signal indicative of the difference therebetween. The servomotor **83** is rotated by the signal of the difference from the servoamplifier **82** to move at least one lens of the projection lens system. The servomotor **83** is operatively connected with the potentiometer **84**, and thus the servomotor **83** rotates the potentiometer **84**. The servomotor **83** stops when the voltage of the potentiometer **84** coincides with the voltage from the focus adjusting dial **15**. Thus, the focusing position of the projection lens system is adjusted.

When all of the above adjustments are completed, a desired image of the pointed spot of the detailed map recorded on the super-microfiche **20** is displayed in the television monitor **18** in enlarged scale. The operator operates the joy stick **17** to find out an individual house or building in the display map. Since the joy stick **17** is capable of continuously moving a part of the map on the television monitor **18**, it is useful for seeing a map along a line such as a street, a river or a railway.

We claim:

1. A graphic information retrieval system comprising in combination:

graphic information recording medium carrying recorded thereon in reduced scale two-dimensionally extending optically readable graphic information,

a display means for displaying a part of said graphic information in enlarged scale, said display means including an optical reading means having an optical axis extending perpendicular to said graphic information and an electric display means which displays the information read by said optical reading means,

means for moving said graphic information recording medium in a plane in which said information two-dimensionally extends upon receipt of an electric position signal to bring various portions of said graphic information into alignment with said optical axis of the optical reading means, and

a position signal generating means including a graphic information carrying means which carries graphic information similar to said graphic information recorded in said recording medium, and detecting means which points at a position on the graphic information and generates an electric position signal representing the pointed at position to be given to said recording medium moving means.

2. A graphic information retrieval system as defined in claim **1** wherein said graphic information is a map and said recording medium is a microfilm on which the map is recorded in reduced scale.

3. A graphic information retrieval system as defined in claim **2** wherein said map recorded on the microfilm is a detailed map showing individual buildings and houses.

4. A graphic information retrieval system as defined in claim **1** wherein said electric display means is a television monitor, and said optical reading means comprises an image pick-up tube electrically connected with said television monitor and an optical projection system which focuses an image of a part of said graphic infor-

mation carried by said recording medium on said image pick-up tube.

5. A graphic information retrieval system as defined in claim 1 wherein said detecting means of said position signal generating means includes a detecting pen which is used to point at a spot on said graphic information carried by said graphic information carrying means in the position signal generating means.

6. A graphic information retrieval system as defined in claim 5 wherein said position signal generating means further includes a joy stick for operating said recording medium moving means to move the recording medium continuously from the position which is determined by said detecting pen.

7. A graphic information retrieval system as defined in claim 1 wherein said display means further includes means for changing the ratio of enlargement of the image displayed by the electric display means.

8. A graphic information retrieval system as defined in claim 7 wherein said ratio changing means comprises a lens turret including a selectable plurality of lenses of different focal length provided in said optical reading means and externally operable electric input means provided on said display means for giving a signal to said lens turret to select one of the lenses.

* * * * *

EXHIBIT 3

(19) Europäisches Patentamt
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(54) System for deleting picture information.

(57) A system for deleting picture information is provided for a picture information file. The system has a keyboard (3), a 2-dimension scanning device (11), a magnetic tape device (17), a display device (13) and a control device (1) including a microprocessor (31). The deletion of the picture information recorded in the magnetic tape device (17) is performed by recording the delete mark in a delete mark recording area of the retrieval title corresponding to the picture information to be deleted.

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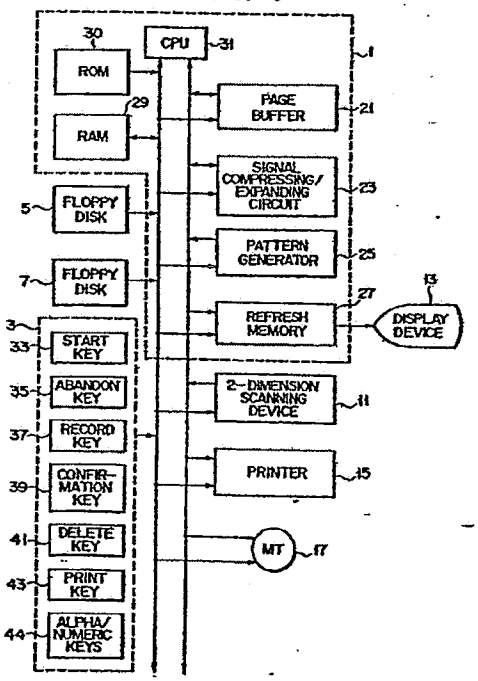
Croydon Printing Company Ltd.

FIG. 3


30
CPU
31
1
ROM
29
RAM
PAGE BUFFER
21
SIGNAL COMPRESSING/ EXPANDING CIRCUIT
23
5
FLOPPY DISK
PATTERN GENERATOR
25
7
FLOPPY DISK
13
27
3
REFRESH MEMORY
DISPLAY DEVICE
33
START KEY
35
ABANDON KEY
2-DIMENSION SCANNING DEVICE
11
37
RECORD KEY
39
CONFIR-MATION KEY
PRINTER
15
41
DELETE KEY
MT
17
43
PRINT KEY
44
ALPHA/ NUMERIC KEYS

System for deleting picture information

The present invention relates to a deleting system of picture information in a picture information file device which is capable of recording picture information such as a document and which is capable of retrieving and outputting the recorded picture information as needed.

A conventional system for storing and retrieving a document picture is known wherein pictures reduced in scale are directly recorded on microfilms. As an improvement over this system, a picture information file device has been proposed which uses a 2-dimension scanning device utilizing photoelectric conversion techniques with a laser beam or CCD elements. This 2-dimension scanning device decomposes a document picture into picture elements, converts the picture elements into picture signals, and records the picture signals on a magnetic recording medium at a high density. This type of device also stores on the magnetic recording medium picture information and a retrieval title consisting of a retrieval code indicating a recording position of the picture information and so on. Therefore, as the need arises, the retrieval code may be input to retrieve the corresponding document picture as a hard copy.

However, with this type of device, the retrieval title and picture information must be deleted in order to

delete the picture information recorded on a magnetic recording medium, resulting in inconvenience. Recording of new picture information in the deleted area also requires complex procedure.

It is an object of the present invention to provide a deleting system of picture information which eliminates the drawbacks of the conventional systems and which allows easy deletion of recorded picture information and recording of new picture information in place of the deleted picture information.

In order to achieve the above object, there is provided according to the present invention, a deleting system for variable length picture information in a picture information file device which stores picture information and a retrieval title including a retrieval code for retrieving the picture information, a track number and a block number, a recording area for recording the length of the picture information, and a delete mark representing that the picture information is deleted, and which outputs picture information corresponding to an input retrieval code, including:

(a) a control information input device comprising a keyboard having an abandon key for specifying abandonment of the picture information, a record key for specifying recording of the picture information, and a delete key for specifying deletion of the picture information;

(b) a 2-dimension scanning device which two-dimensionally scans the picture information for photoelectric conversion and outputs the photoelectrically converted picture information;

(c) a magnetic tape device for recording the photoelectrically converted picture information in an area represented by the track number and the block number on a magnetic tape;

(d) a display device for displaying picture information recorded or to be recorded by said magnetic

tape device; and

(e) a control device which has a programmable microprocessor connected to said control information input device, said 2-dimension scanning device, said magnetic tape device and said display device, and which includes a central processing unit for receiving input signals for controlling the recording, abandonment and deletion of the picture information, a read-only memory device for storing permanent programs, and a random access memory for storing data input by said control information input device, said read-only memory device storing the permanent programs having functions of said central processing unit so that said control device may perform specific functions according to the permanent programs;

wherein said control information input device, said 2-dimension scanning device, said display device and said magnetic tape device are so controlled that a delete mark is written in a delete mark recording area in the retrieval title for deleting the picture information recorded on the magnetic tape.

According to the present invention, a delete mark recording area is included in the retrieval title so that deletion of picture information may be performed by recording a delete mark in this delete mark recording area. Therefore, deletion of recorded picture information may be performed with ease, and new picture information may also be recorded in the deleted area with ease.

Other objects and features of the present invention will be apparent from the following description taken in connection with the accompanying drawings, in which:

Fig. 1 is a schematic view of a picture information file device to which the recording system of picture information according to the present invention is applied;

Fig. 2 is a block diagram showing an embodiment of the recording system of picture information of the

present invention;

Fig. 3 is a detailed block diagram showing a main control device and an input device shown in Fig. 2;

Fig. 4 is a view schematically showing a cassette tape of a magnetic tape device and a tape feed mechanism shown in Figs. 2 and 3;

Fig. 5 is a view showing the configuration of tracks of the cassette tape shown in Fig. 4;

Figs. 6A and 6B are views showing the recording formats of retrieval titles and picture information written in the tracks of the cassette tape shown in Fig. 5, wherein Fig. 6A shows the recording format of the retrieval titles and Fig. 6B shows the recording format of the picture information;

Figs. 7A and 7B are flow charts showing the control operation of the main control device for performing registering of picture information;

Fig. 8 is a flow chart showing the control operation of the main control device for performing retrieval and reproduction of the registered picture information;

Fig. 9 is a flow chart showing the control operation of the main control device for deleting the registered picture information; and

Figs. 10 to 12 show modifications of the embodiment of the present invention shown in Fig. 3, wherein Fig. 10 is a block diagram of a system which uses a magnetic disk device in place of a magnetic tape device shown in Fig. 3, Fig. 11 is a block diagram of a system which stores control programs in a floppy disk in place of a ROM, and Fig. 12 is a block diagram showing a system which stores the control programs in a floppy disk in place of the ROM and which uses a magnetic disk device in place of the magnetic tape device.

Fig. 1 is a schematic view of a picture information file device to which the recording system of picture information of the present invention is applied.

Referring to Fig. 1, when an original is set on an original table 2, the original is subjected to 2-dimensional scanning by a laser scanning system 4 for reading the picture information. The picture information is recorded on a magnetic tape 6. The picture information recorded on the magnetic tape 6 is retrieved according to a retrieval code input from a keyboard and displayed at a display device 8. If necessary, a hard copy 12 is prepared by an electro-photographic processing system 10.

Fig. 2 is a block diagram showing the configuration of a system for storing and retrieving picture information according to the present invention. According to input information from an input device 3 (for example, a keyboard), a main control device 1 performs editing processes such as recording, reproduction, addition, insertion, deletion and so on of picture information and retrieval titles; and controls devices connected to this main control device 1. First and second floppy disks 5 and 7 store application programs, and the main control device 1 performs control according to these application programs.

Picture information 9 such as a document is photo-electrically converted by 2-dimensional scanning by a 2-dimension scanning device 11. The photoelectrically converted picture information (video signal) is supplied through the main control device 1 to a display device 13 such as a CRT display, and a printer 15 or a magnetic tape device 17. The 2-dimension scanning device 11 includes a switch (not shown) for controlling the binary encoding level according to the density of the original. The display device 13 displays the retrieval title from the keyboard 3, and the picture information from the 2-dimension scanning device 11 or from the magnetic tape device 17. The printer 15 receives the picture information from the 2-dimension scanning device 11 or from the magnetic tape device 17 and forms

a 2-dimensional visible image, which is output as a hard copy 19.

Fig. 3 is a block diagram showing in detail the main control device and the input device shown in Fig. 2. The main control device 1 comprises a page buffer 21 for storing the picture information in units of pages, a signal compressing/expanding circuit 23 for performing signal compression and expansion by the MH (modified Hoffman) conversion or the MH inverse conversion, a pattern generator 25 for generating a character pattern, a refresh memory 27 for storing information to be displayed at the display device 13, a random access memory (RAM) 29 having a capacity sufficient to store the retrieval titles corresponding to one magnetic tape to be described later, and a central processing unit (CPU) 31 for controlling these circuits. An 8-bit microprocessor 8085 available from Intel. Corp., U.S.A. may be adopted as the CPU 31. A read-only memory (ROM) device 30 is externally connected to the CPU 13 and stores control programs to control the devices described above according to the registering mode, the retrieval mode, and the deletion mode of picture information.

The input device (keyboard) 3 includes a start key 33 which is depressed for storing a retrieval title or for setting the original, an abandon key 35 which is depressed for abandoning the picture information stored in the page buffer 21, a record key 37 which is depressed for recording the picture information stored in the page buffer 21 on a magnetic tape to be described later, a confirmation key 39 which is depressed when the picture information recorded on the magnetic tape is satisfactory, a delete key 41 which is depressed for deleting the picture information stored on the magnetic tape, a print key 43 which is depressed when the hard copy 19 of the picture information stored in the page buffer 21 is necessary, and alpha/numeric keys 44 for numerals 0 to 9 and for letters of the alphabet.

Fig. 4 is a schematic view showing a cassette tape and a feed mechanism of the magnetic tape device 17. Inside a casing 45 is disposed a stationary reel 47 which does not rotate and around which is wound magnetic tape 49 of, for example, 1/2 inch width (about 12.7 mm) and about 36 m length. When the cassette tape of this construction is mounted, the innermost turn of the tape is guided outside through a window 47a formed in the reel 47, is fed at high speed (about 5 m/sec) in the direction shown by arrow a in the figure by a capstan 51 and a pinch roller 53, and is then wound around the outermost turn of the tape 49. Therefore, the tape 49 completes one course in about 7.2 seconds. This one travel of the tape is confirmed by optically detecting at a mark detector 57 a tape mark 55 such as a silver paper chip attached to a connecting part 49a of the tape 49 as shown in Fig. 5. The output from the detector 57 is used as a reference for detecting a block position (to be described later) on the tape 49. Thus, 200 recording tracks 59 (of about 40 μm width and about 52 μm pitch) are formed parallel to each other along the direction of arrow a on the tape 49 as shown in Fig. 5. Track numbers "0, 1, 2,..., 198, 199" are sequentially assigned to the recording tracks 59 from the lowermost track. Two substantially central tracks (track numbers 99 and 100 of which track number 99 is auxiliary) define a recording track 59_1 which records an inherent retrieval title (consisting of the retrieval code and the recording address which, in turn, consists of the track number and the block number) corresponding to picture information of one unit; and the remaining 198 recording tracks (track numbers 0 to 98 and 101 to 199) define information recording tracks 59_2 for recording the picture information. Each recording track 59 is divided into 256 blocks in the longitudinal direction of the tape as shown in Fig. 5; each block is sequentially assigned block numbers "0, 1, 2,.,., 254, 255"

starting from the tape mark 55. Recording and reproduction of information on the tape 49 is performed by selecting a desired recording track 59 by reciprocally moving, by a head access mechanism (not shown), a recording/reproducing head (2-gap magnetic head having the function of deletion) 61 disposed in the vicinity of the capstan 51 a certain distance in units of microns in a direction b perpendicular to the direction shown by the arrow a.

Fig. 6A shows the recording format of the respective retrieval titles on the retrieval title recording track 59_1. The retrieval titles are sequentially recorded in a retrieval code recording area 63 which records the retrieval code; a recording address recording area 65 which records recording addresses of a track number and a block number of the track which stores the picture information corresponding to this retrieval code; a length of picture information recording area 67 which records the length of the picture information, that is, how many blocks are involved in storing this picture information; and a delete mark recording area 69 which records a delete mark representing whether or not the picture information corresponding to the retrieval code is deleted. Fig. 6B shows the recording format of the picture information in the information recording track 59_2, wherein picture information 71 is recorded on a plurality of blocks.

Registration of the picture information with a picture information file device adopting the deleting system of picture information according to the present invention will be described with the flow charts shown in Figs. 7A and 7B. The flow charts shown in Figs. 7A and 7B show the control operation for registering the (k + 1)th section of picture information when k sections of picture information including deleted picture information are already registered on the magnetic tape 49.

The registering mode is first set from the keyboard 3. This may be accomplished by inputting "1" when, for example, the display device displays messages of "registering mode: 1", "retrieval mode: 2", and "deleting mode: 3". When the registering mode is set, the retrieval code of the picture information to be registered is input from the keyboard 3 in step 73, and in step 75, the start key 33 is depressed. Upon this operation, the CPU 31 performs, in step 77, checking of the input data such as checking of the number of digits, the kind of characters and so on according to the format of the retrieval code which is prepared in advance. The retrieval codes which are already registered are checked for double registration. If the retrieval code is the correct one, it is stored in the RAM 29. If the retrieval code is not the correct one, the program returns to step 73, and another retrieval code is input. In step 79, when the original is set by the operator for the 2-dimension scanning device 11 and, in step 81, the start key 33 is depressed, the CPU 31 operates the 2-dimension scanning device 11 and drives the magnetic tape 49. In step 83, the 2-dimension scanning device 11 performs 2-dimension scanning and photoelectric conversion of the picture information such as a document set in step 79. The line information which is photoelectrically converted is sequentially stored in the page buffer 21. When picture information corresponding to one page is stored in the page buffer 21, the picture information is stored in the refresh memory 27 and is displayed at the display device 13 in step 85.

In step 87, the operator checks on the display to determine if the original is set straight or bent, and if the density of the orignal matches with the binary encoding level of the 2-dimension scanning device 11. If the picture information is not satisfactory, the abandon key 35 is depressed. Then, the CPU 31 deletes the contents in the page buffer 21 and the refresh

memory 27. If the original is not set straight or bent, the original is reset. If the density is improper, the binary encoding level of the 2-dimension scanning device 11 is adjusted. The program returnes to step 79, the original is reset and the procedure as described above is performed again.

If the display on the display device 13 is satisfactory, the record key 37 is depressed in step 91. Then, in step 93, the CPU 31 band-compresses, at the signal compressing/expanding circuit 23 by the conventional MH (modified Hoffman) conversion, the picture information of one unit stored in the page buffer 21 one scanning line at a time. The compressed line information is stored again in the page buffer 21.

In step 95, the CPU 31 computes the length (block number) L_{k+1} of the compressed picture information which is stored in the page buffer 21. This may be accomplished by dividing the amount of the compressed picture information by the amount of the recording information in one block. In step 97 to follow, a counter i is set to "1". In step 99, it is sequentially checked to determine if the delete mark is attached to each of the retrieval titles in the RAM 29. If it is judged in step 101 that the ith retrieval title has the delete mark, the length Li of the deleted picture information is compared in step 103 with the length L_{k+1} of the new picture information to be registered. If it is judged in step 105 that the picture information to be registered is shorter than or equal to the deleted picture information, the CPU 31, in step 107, updates the old retrieval title in the RAM 29 to the retrieval title consisting of the retrieval code of the new picture information and deletes the delete mark. The CPU 31 initiates the travel of the magnetic tape 49 and moves the head to the corresponding information recording track 59_2. The CPU 31 thus records the compressed picture information stored in the page buffer 21 starting

from a predetermined block. If it is judged in step 105 that the deleted picture information is longer than or equal to the picture information to be registered, it is judged in step 109, whether the content of the counter i is k, that is, if the recorded retrieval titles have been checked to the last one. If it is judged that this checking has not been completed, the counter i is incremented in step 111 and the program returns to step 99. The CPU 31 then checks if the delete mark is attached to the next code in the RAM 29. If there is a retrieval title to which the delete mark is attached, the same operation as described above and the recording of the new picture information are performed.

If, in step 101, there is no retrieval title to which the delete mark is attached and, in step 109, the content of the counter i is k, that is, the retrieval titles are checked to the last one, the new picture information is recorded in the (k + 1)th picture information recording area.

The retrieval and reproduction of the picture information registered in this manner will now be described with reference to the flow chart shown in Fig. 8. The retrieval mode is set from the keyboard 3. In this embodiment, the retrieval mode is set by inputting "2" as was described earlier. When the retrieval mode is set, the retrieval code is first input in step 115. In step 117, the start key 33 is depressed. Then, the CPU 31 checks the input data such as the number of digits, the kind of characters and so on according to the format of the retrieval code which is prepared in advance. Since this checking procedure is the same as in step 77 described with reference to Fig. 7A, the description thereof will be omitted. When the correct retrieval code is input, the CPU 31 initiates in step 121, the travel of the magnetic tape 49 and moves the head 61 to the retrieval title recording

track 59_1 to start reproduction from this track. Then, all the reproduced retrieval titles, that is, the retrieval codes and the recording address representing the track numbers and the initiating blocking numbers of the corresponding picture information, are stored in the RAM 29. In step 123, the CPU 31 sequentially compares the retrieval codes of the retrieval titles stored in the RAM 29 with the input retrieval code. If, in step 125, there is no retrieval code which coincides with the input retrieval code, an error display is performed in step 127 indicating that retrieval is impossible and the retrieval operation is terminated. When there is a retrieval code which coincides with the input retrieval code, in step 129, the track number and the block number of the coincident retrieval code are retrieved from the retrieval title which is stored in the RAM 29. The CPU 31 moves the head 61 to the information recording track 59_2 corresponding to the track number thus obtained, reads the picture information at this track, and stores the picture information in the page buffer 21. Thereafter, in step 131, the picture information for one scanning line at a time is subjected to band compression by MH inverse conversion at the signal compressing/expanding circuit 23 to return it to the original picture information, and the picture information is stored in the page buffer 21. When all the reproduced picture information for one page is stored in the page buffer 21, the CPU 31 supplies in step 133, the picture information to the refresh memory 27 and displays it at the display device 13. When the operator judges that the picture information thus displayed is to be printed, the operator depresses the print key 43 in step 135. Then, the CPU 31 supplies the picture information stored in the page buffer 21 to the printer 15 which produces the hard copy 19 in step 137.

Hard copies 19 of the corresponding picture

information are obtained by the same operation when other retrieval codes are input.

Deletion of the picture information registered in this manner will now be described with reference to the flow chart shown in Fig. 9. First, the deletion mode is set from the keyboard 3. In this embodiment, the deletion mode is set by inputting "3" as has been described earlier. When the deletion mode is set, the retrieval code is first input in step 139. In step 141, the start key 33 is depressed. Then, the CPU 31 checks the input data as to the number of digits, the kind of characters and so on according to the format of the retrieval code which is prepared in advance. Since this checking procedure is the same as the checking procedure described with reference to step 77 of Fig. 7A, the description thereof will be omitted. When the correct retrieval code is input, the CPU 31 initiates in step 145, the travel of the magnetic tape 49 and moves the head 61 to the retrieval title recording track 59_1 to start reproducing the data on this track. Then, the length of the picture information (number of blocks), the delete mark, and all the reproduced retrieval titles, that is, the retrieval codes and the recording addresses representing the track numbers and the initiating block numbers of the corresponding picture information, are stored in the RAM 29. In step 147, the CPU 31 sequentially compares the retrieval codes of the retrieval titles stored in the RAM 29 with the input retrieval code. If it is judged in step 149 that there is no retrieval code coincident with the input retrieval code, an error display representing that retrieval is impossible is performed in step 151, and the retrieval operation is terminated. If the retrieval code coinciding with the input retrieval code is present, the track number and the block number assigned to this coicident retrieval code are retrieved from the retrieval title stored in the RAM 29 in step 153. The CPU 31

moves the head 61 to the information recording track 59_2 corresponding to the track number, reads the picture information of this track, and stores the picture information in the page buffer 21. Thereafter, in step 155, the picture information is subjected one scanning line at a time to band compression by MH inverse conversion at the signal compressing/expanding circuit 23, is converted into the original picture information, and is stored in the page buffer 21. When all the picture information corresponding to one page is stored in the page buffer 21, the CPU 31 supplies the picture information to the refresh memory 27 and displays it at the display device 13 in step 157. If the operator judges, in step 159, that the displayed picture information is to be deleted, the delete key 41 is depressed. Then, the CPU 31 records, in step 161, the delete mark in the delete mark recording area 69 of the corresponding retrieval title in the RAM 29. In this manner, the picture information whose delete mark corresponds with the recorded retrieval title is deleted.

In summary, in the recording area of the picture information whose delete code corresponds to the retrieval title assigned thereto may be recorded picture information of shorter length.

In the embodiment described above, the present invention has been described with reference to the case wherein picture information such as a document is recorded on or reproduced from a magnetic tape device in a picture information file device. However, the present invention is similarly applicable to a magnetic tape device which records or reproduces other kinds of information. Furthermore, the present invention has also been described with reference to the case of a magnetic tape device which uses an endless magnetic tape as the recording medium. However, the present invention may be similary applicable to other information recording devices such as a magnetic tape device which

uses a general magnetic tape and not an endless magnetic tape, a magnetic disk device which uses a magnetic disk as a recording medium of the picture information as shown at 163 in Fig. 10, or an optical disk device which uses an optical disk as the recording medium.

In the embodiment shown in Fig. 3, the control programs are stored in the read-only memory device 30. However, they may alternatively be stored on the floppy disks 5, 7 shown in Fig. 11. Still alternatively, a first floppy disk 5, 7 or a second floppy disk 165 may be incorporated as shown in Fig. 12. In this case, the first floppy disk 5, 7 may store the control programs and the second floppy disk 165 may store the picture information.

Claims:

1. A system for deleting picture information in a picture information file device which stores picture information and a retrieval title including a retrieval code for retrieving the picture information, a track number and a block number, a recording area for recording the length of the picture information, and a delete mark representing that the picture information is deleted, and which outputs picture information corresponding to an input retrieval code, including:

(a) a control information input device (3) comprising a keyboard having an abandon key (35) for specifying abandonment of the picture information, a record key (37) for specifying recording of the picture information, and a delete key (41) for specifying deletion of the picture information;

(b) a 2-dimension scanning device (11) which two-dimensionally scans the picture information for photo-electric conversion and outputs the photoelectrically converted picture information;

(c) a magnetic tape device (17) for recording the photoelectrically converted picture information in an area represented by the track number and the block number on a magnetic tape;

(d) a display device (13) for displaying picture information recorded or to be recorded by said magnetic tape device (17); and

(e) a control device (1) which has a programmable microprocessor connected to said control information input device (3), said 2-dimension scanning device (11), said magnetic tape device (17) and said display device (13), and which includes a central processing unit (31) for receiving input signals for controlling the recording, abandonment and deletion of the picture information, a read-only memory device (30) for storing permanent programs, and a random access memory (29) for

storing data input by said control information input device, said read-only memory device (30) storing the permanent programs having functions of said central processing unit (31) so that said control device (1) may perform specific functions according to the permanent programs, characterized in that said control device (1) is so designed as to control said control information input device (3), said 2-dimension scanning device (11), said display device (13) and said magnetic tape device (17) so that the deletion of the picture information recorded in the magnetic tape device (17) is performed by recording the delete mark in a delete mark recording area of the retrieval title corresponding to the picture information to be deleted.

2. A system for deleting picture information in a picture information file device which stores picture information and a retrieval title including a retrieval code for retrieving the picture information, a track number and a block number, a recording area for recording the length of the picture information, and a delete mark representing that the picture information is deleted, and which outputs picture information corresponding to an input retrieval code, including:

(a) a control information input device (3) comprising a keyboard having an abandon key (35) for specifying abandonment of the picture information, a record key (37) for specifying recording of the picture information, and a delete key (41) for specifying deletion of the picture information;

(b) a 2-dimension scanning device (11) which two-dimensionally scans the picture information for photo-electric conversion and outputs the photoelectrically converted picture information;

(c) a disk device (163) for recording the photoelectrically converted picture information in an area represented by the track number and the block number on a disk;

(d) a display device (13) for displaying picture information recorded or to be recorded by said disk device (163); and

(e) a control device (1) which has a programmable microprocessor connected to said control information input device (3), said 2-dimension scanning device (11), said disk device (163) and said display device (13), and which includes a central processing unit (31) for receiving input signals for controlling the recording, abandonment and deletion of the picture information, a read-only memory device (30) for storing permanent programs, and a random access memory (29) for storing data input by said control information input device (3), said read-only memory device (30) storing the permanent programs having functions of said central processing unit (31) so that said control device (1) may perform specific functions according to the permanent programs, characterized in that

said control device (1) is so designed as to control said control information input device (3), said 2-dimension scanning device (11), said display device and said disk device (163) so that the deletion of the picture information recorded in the disk device (163) is performed by recording the delete mark in a delete mark recording area of the retrieval title corresponding to the picture information to be deleted.

3. A system for deleting picture information in a picture information file device which stores picture information and a retrieval title including a retrieval code for retrieving the picture information, a track number and a block number, a recording area for recording the length of the picture information, and a delete mark representing that the picture information is deleted, and which outputs picture information corresponding to an input retrieval code, including:

(a) a control information input device (3) comprising a keyboard having an abandon key (35) for

specifying abandonment of the picture information, a record key (37) for specifying recording of the picture information, and a delete key (41) for specifying deletion of the picture information;

(b) a 2-dimension scanning device (11) which two-dimensionally scans the picture information for photo-electric conversion and outputs the photoelectrically converted picture information;

(c) a magnetic tape device (17) for recording the photoelectrically converted picture information in an area represented by the track number and the block number on a magnetic tape;

(d) a display device (13) for displaying picture information recorded or to be recorded by said magnetic tape device (17);

(e) a disk device (5, 7) storing permanent programs having functions of a central processing unit to be described later; and

(f) a control device (1) which has a programmable microprocessor connected to said control information input device (3), said 2-dimension scanning device (11), said magnetic tape device (17) and said display device (13), and which includes a central processing unit (31) for receiving control data for controlling the recording, abandonment and deletion of the picture information, and a random access memory (29) for storing data input by said control information input device (3), said disk device (17) storing the permanent programs having functions of said central processing unit (31) so that said control device (1) may perform specific functions according to the permanent programs stored in said disk device (5, 7), characterized in that

said control device (1) is so designed as to control said control information input device (3), said 2-dimension scanning device (11), said display device (13) and said magnetic tape device (17) so that the deletion

of the picture information recorded in said magnetic tape device (17) is performed by recording the delete mark in a delete mark recording area of the retrieval title corresponding to the picture information to be deleted.

4. A system for deleting picture information in a picture information file device which stores picture information and a retrieval title including a retrieval code for retrieving the picture information, a track number and a block number, a recording area for recording the length of the picture information, and a delete mark representing that the picture information is deleted, and which outputs picture information corresponding to an input retrieval code, including:

(a) a control information input device (3) comprising a keyboard having an abandon key (35) for specifying abandonment of the picture information, a record key (37) for specifying recording of the picture information, and a delete key (41) for specifying deletion of the picture information;

(b) a 2-dimension scanning device (11) which two-dimensionally scans the picture information for photo-electric conversion and outputs the photoelectrically converted picture information;

(c) a first disk device (165) for recording the photoelectrically converted picture information in an area represented by the track number and the block number on a disk of said first disk;

(d) a display device (13) for displaying picture information recorded or to be recorded by said first disk device;

(e) a second disk device (5, 7) for storing permanent programs having functions of a central processing unit to be described later; and

(f) a control device (1) which has a programmable microprocessor connected to said control information input device (3), said 2-dimension scanning device (11),

said first disk device (165) and said display device (13), and which includes a central processing unit (31) for receiving control data for controlling the recording, abandonment and deletion of the picture information, and a random access memory (29) for storing data input by said control information input device (3), said second disk device (5, 7) storing the permanent programs having functions of said central processing unit so that said control device (1) may perform specific functions according to the permanent programs stored in said second disk device (5, 7), characterized in that said control device (1) is so designed as to control said control information input device (3), said 2-dimension scanning device (11), said display device (13) and said first disk device (165) so that the deletion of the picture information recorded in said first disk device (165) is performed by recording the delete mark in a delete mark recording area of the retrieval title corresponding to the picture information to be deleted.

5. A system for deleting picture information according to claim 1, 2, 3 or 4, characterized in that a compandor (23) is further provided for performing compression and expansion of the picture information by modified Hoffman conversion or modified Hoffman inverse conversion.

6. A system for deleting picture information according to claim 1, 2, 3 or 4, characterized in that a printer (15) is further provided for producing a hard copy of the picture information displayed at said display device (13).

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FIG. 1

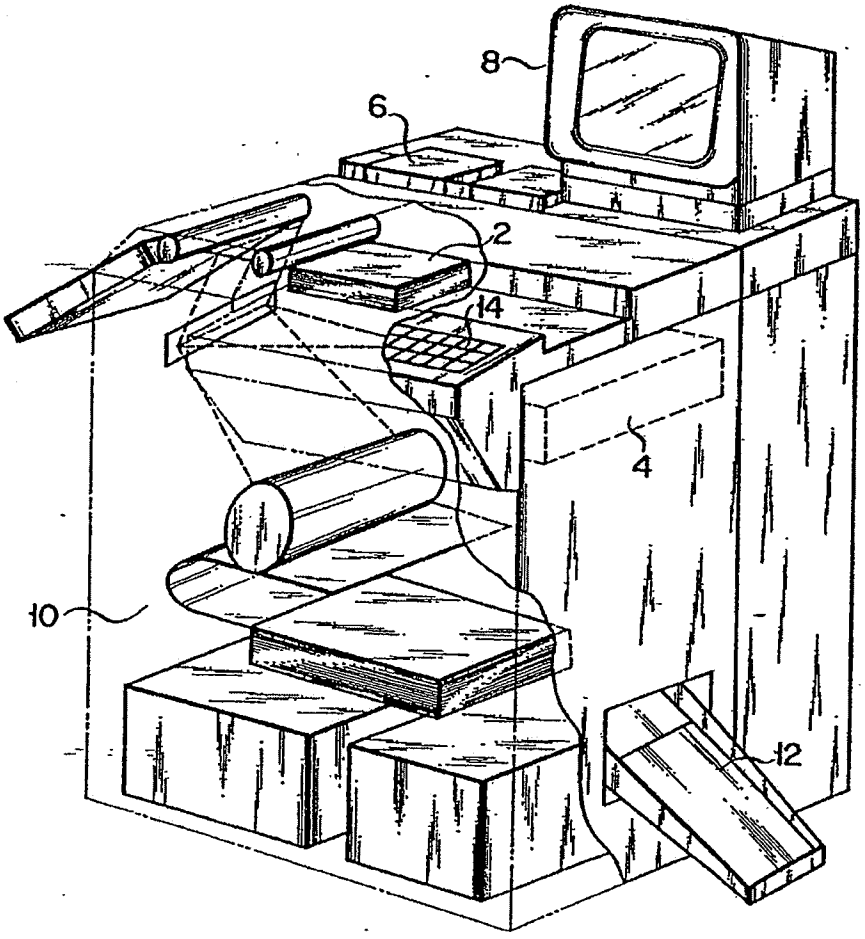

FIG. 2

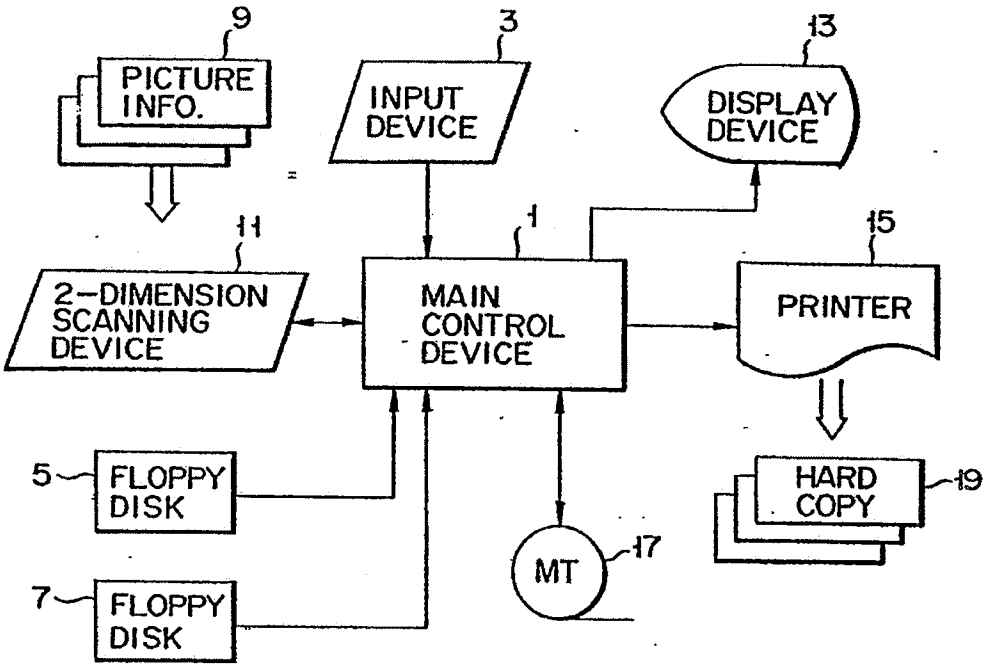

FIG. 4

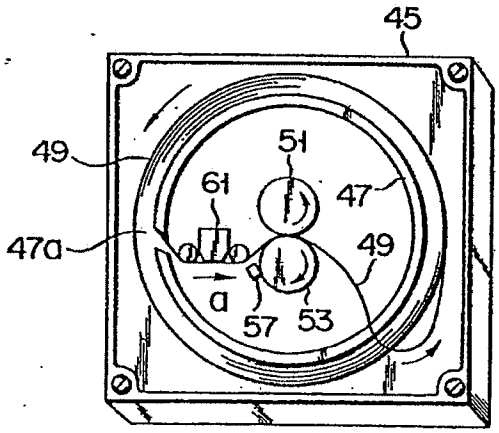

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FIG. 3

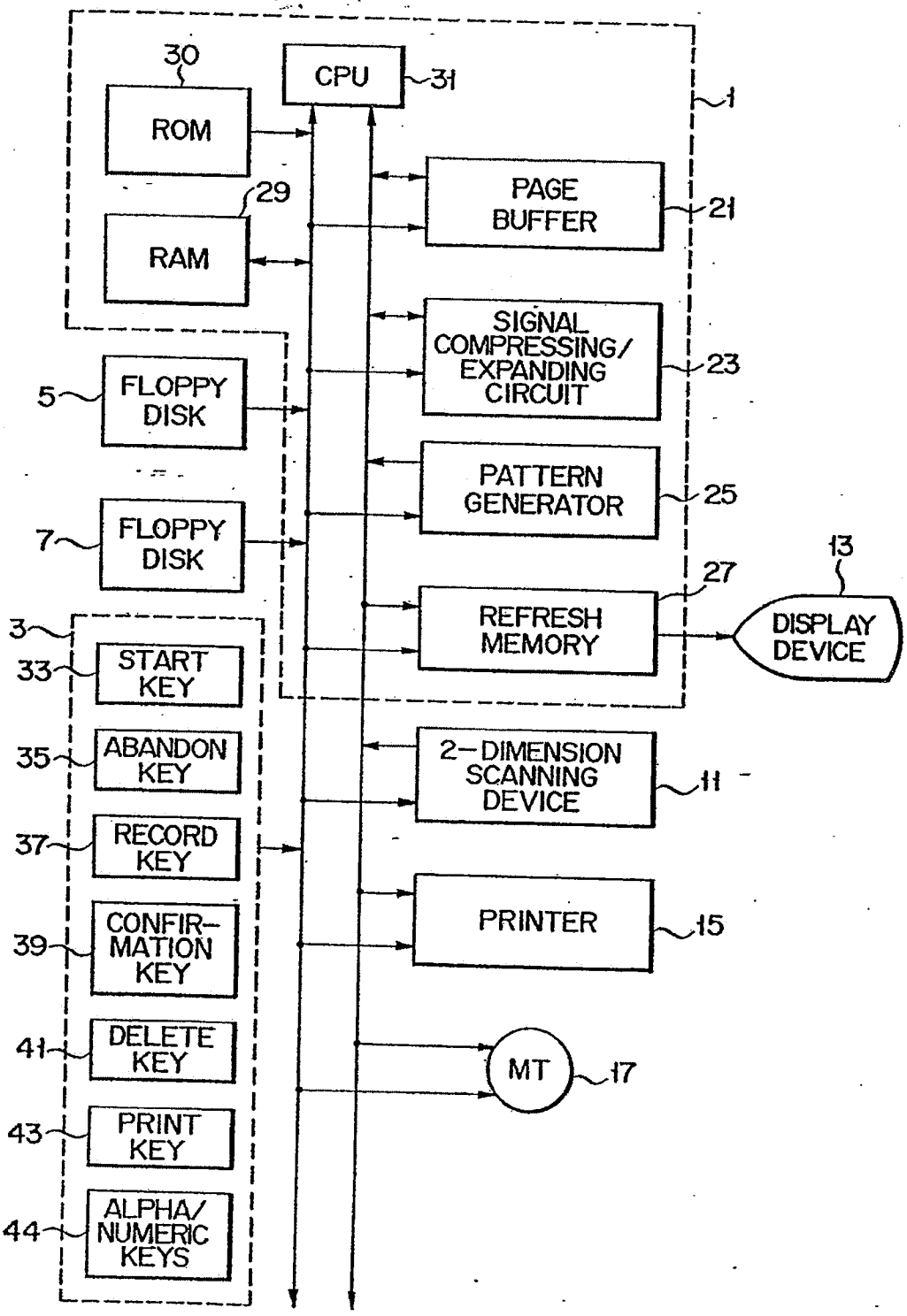

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FIG. 5

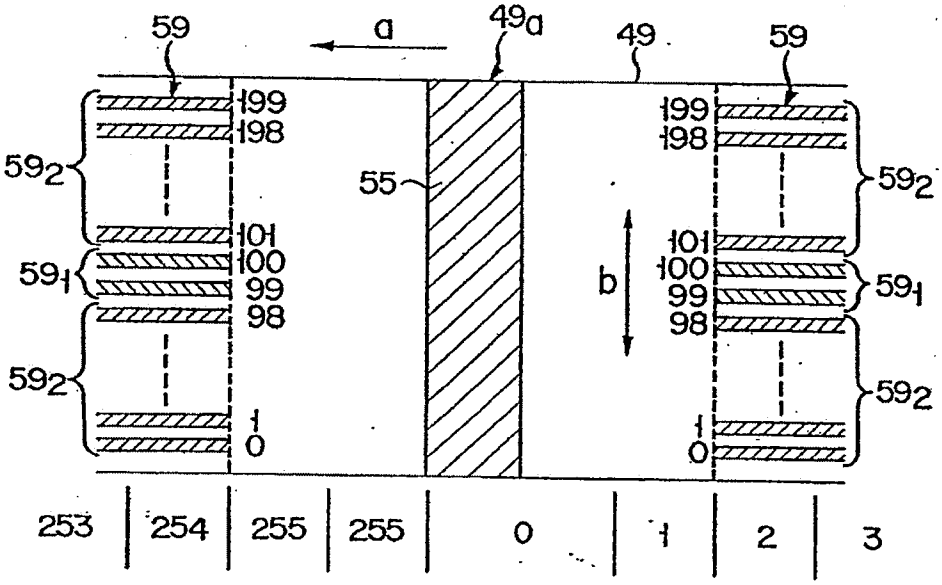

FIG. 6A

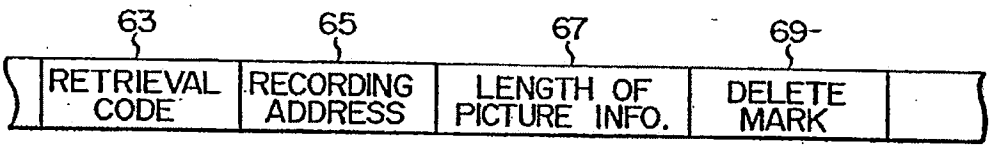

FIG. 6B

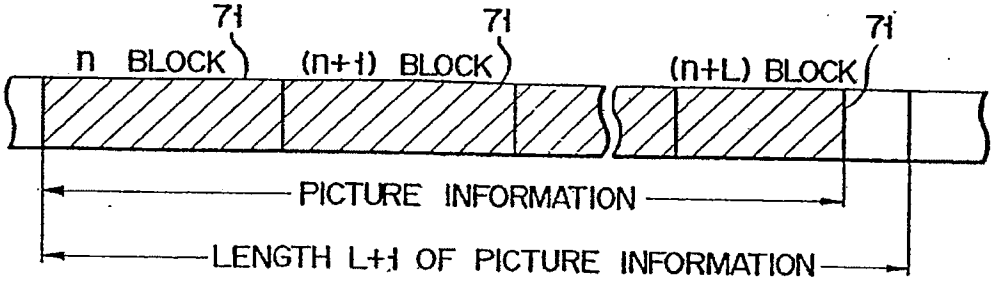

FIG. 7A

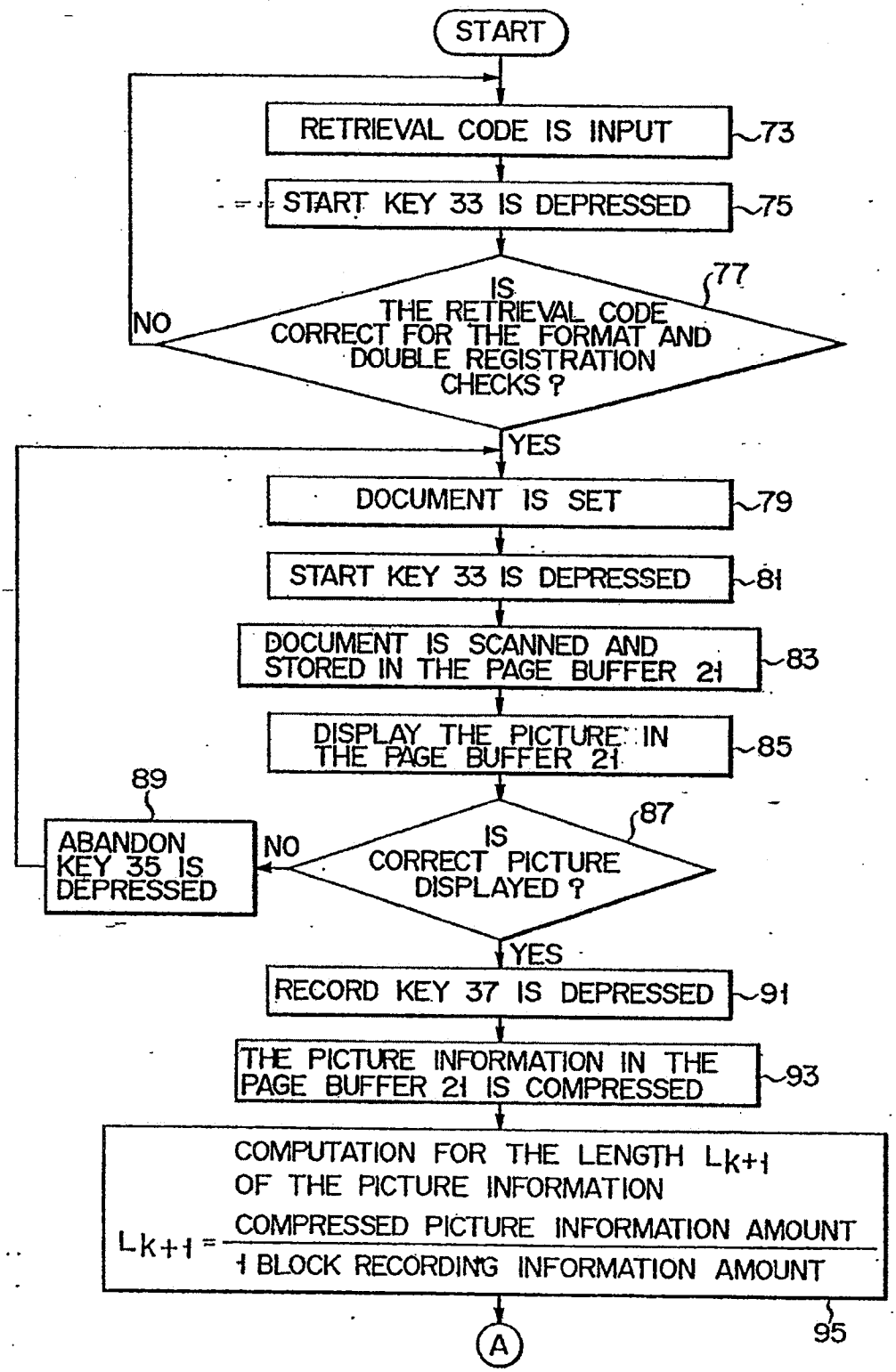
START
RETRIEVAL CODE IS INPUT
73
START KEY 33 IS DEPRESSED
75
77
IS THE RETRIEVAL CODE CORRECT FOR THE FORMAT AND DOUBLE REGISTRATION CHECKS ?
NO
YES
DOCUMENT IS SET
79
START KEY 33 IS DEPRESSED
81
DOCUMENT IS SCANNED AND STORED IN THE PAGE BUFFER 21
83
DISPLAY THE PICTURE IN THE PAGE BUFFER 21
85
87
IS CORRECT PICTURE DISPLAYED ?
NO
89
ABANDON KEY 35 IS DEPRESSED
YES
RECORD KEY 37 IS DEPRESSED
91
THE PICTURE INFORMATION IN THE PAGE BUFFER 21 IS COMPRESSED
93
COMPUTATION FOR THE LENGTH Lk+1 OF THE PICTURE INFORMATION
Lk+1 = COMPRESSED PICTURE INFORMATION AMOUNT / 1 BLOCK RECORDING INFORMATION AMOUNT
95
A

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FIG. 7B

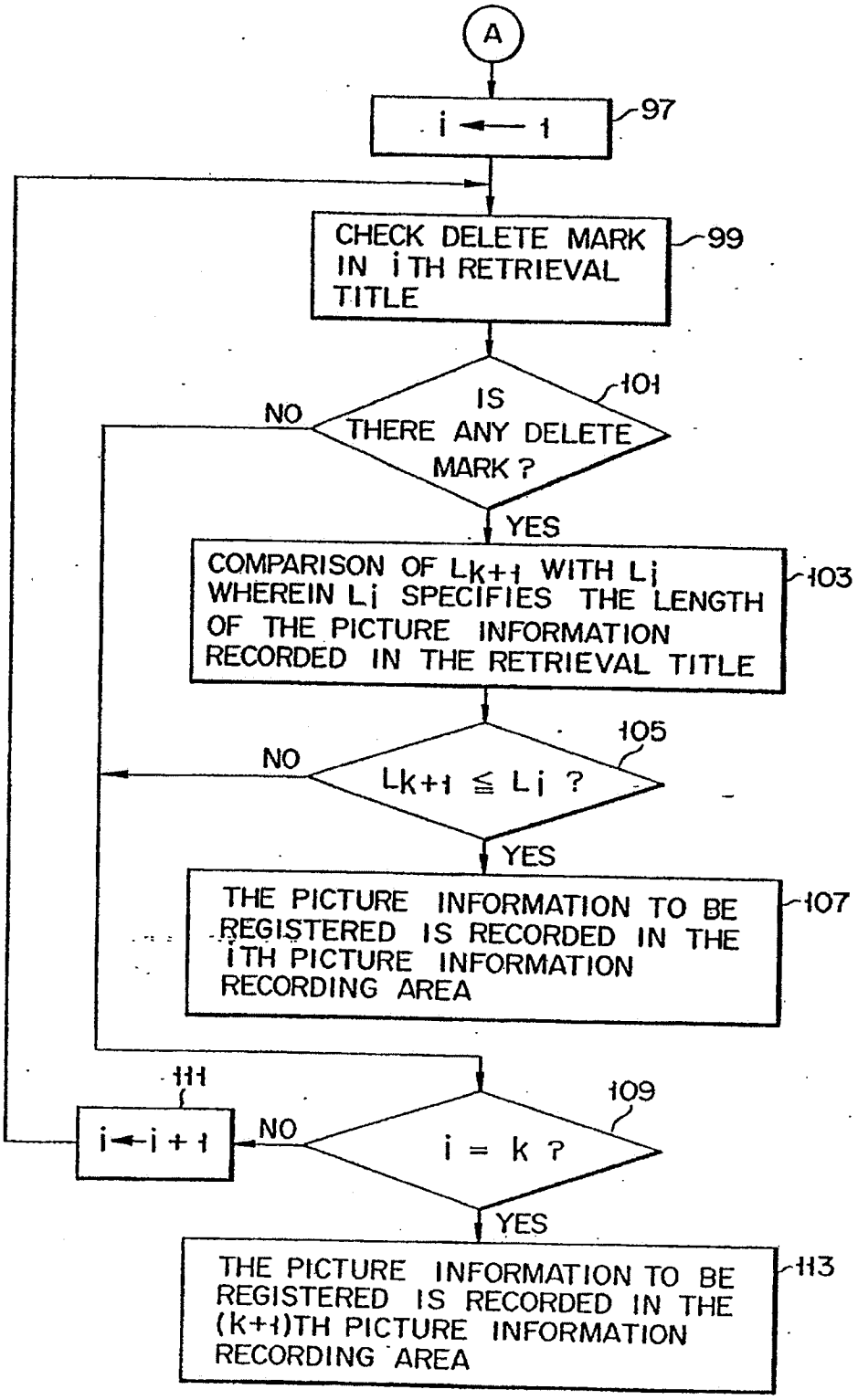

FIG. 8

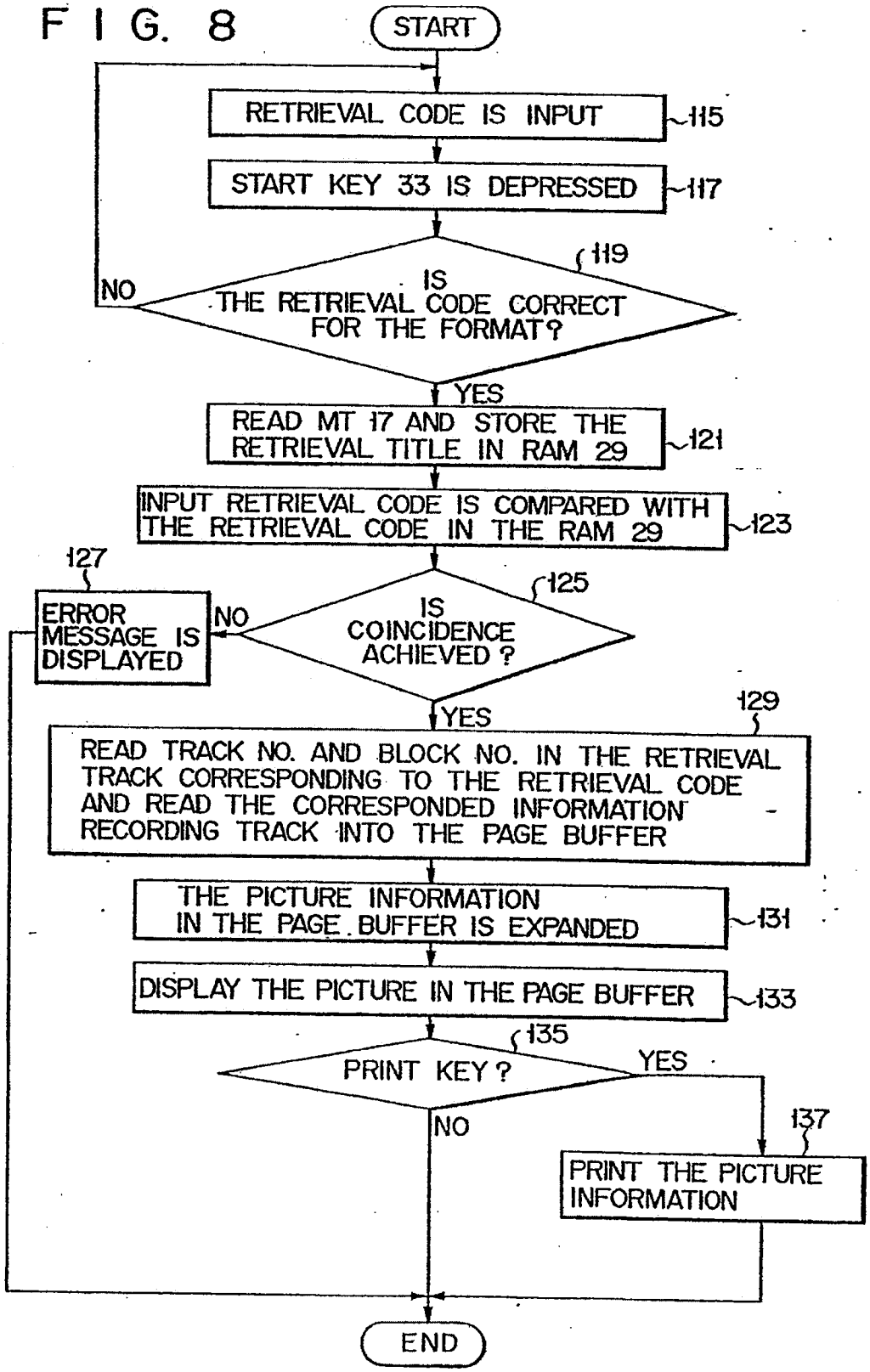

FIG. 9

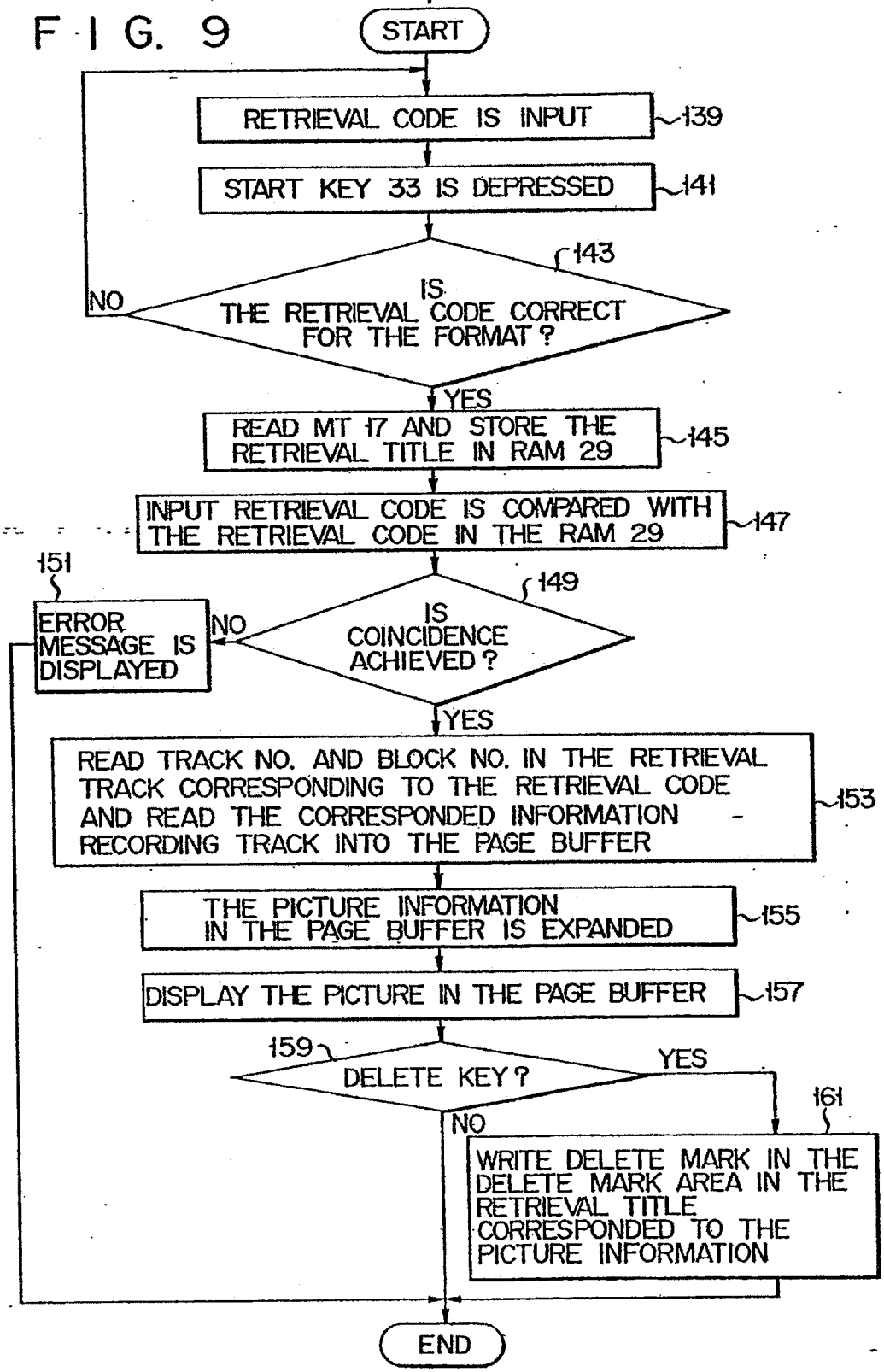
START
RETRIEVAL CODE IS INPUT
139
START KEY 33 IS DEPRESSED
141
143
IS THE RETRIEVAL CODE CORRECT FOR THE FORMAT?
NO
YES
READ MT 17 AND STORE THE RETRIEVAL TITLE IN RAM 29
145
INPUT RETRIEVAL CODE IS COMPARED WITH THE RETRIEVAL CODE IN THE RAM 29
147
151
149
ERROR MESSAGE IS DISPLAYED
NO
IS COINCIDENCE ACHIEVED?
YES
READ TRACK NO. AND BLOCK NO. IN THE RETRIEVAL TRACK CORRESPONDING TO THE RETRIEVAL CODE AND READ THE CORRESPONDED INFORMATION RECORDING TRACK INTO THE PAGE BUFFER
153
THE PICTURE INFORMATION IN THE PAGE BUFFER IS EXPANDED
155
DISPLAY THE PICTURE IN THE PAGE BUFFER
157
159
DELETE KEY?
YES
NO
161
WRITE DELETE MARK IN THE DELETE MARK AREA IN THE RETRIEVAL TITLE CORRESPONDED TO THE PICTURE INFORMATION
END

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FIG. 10

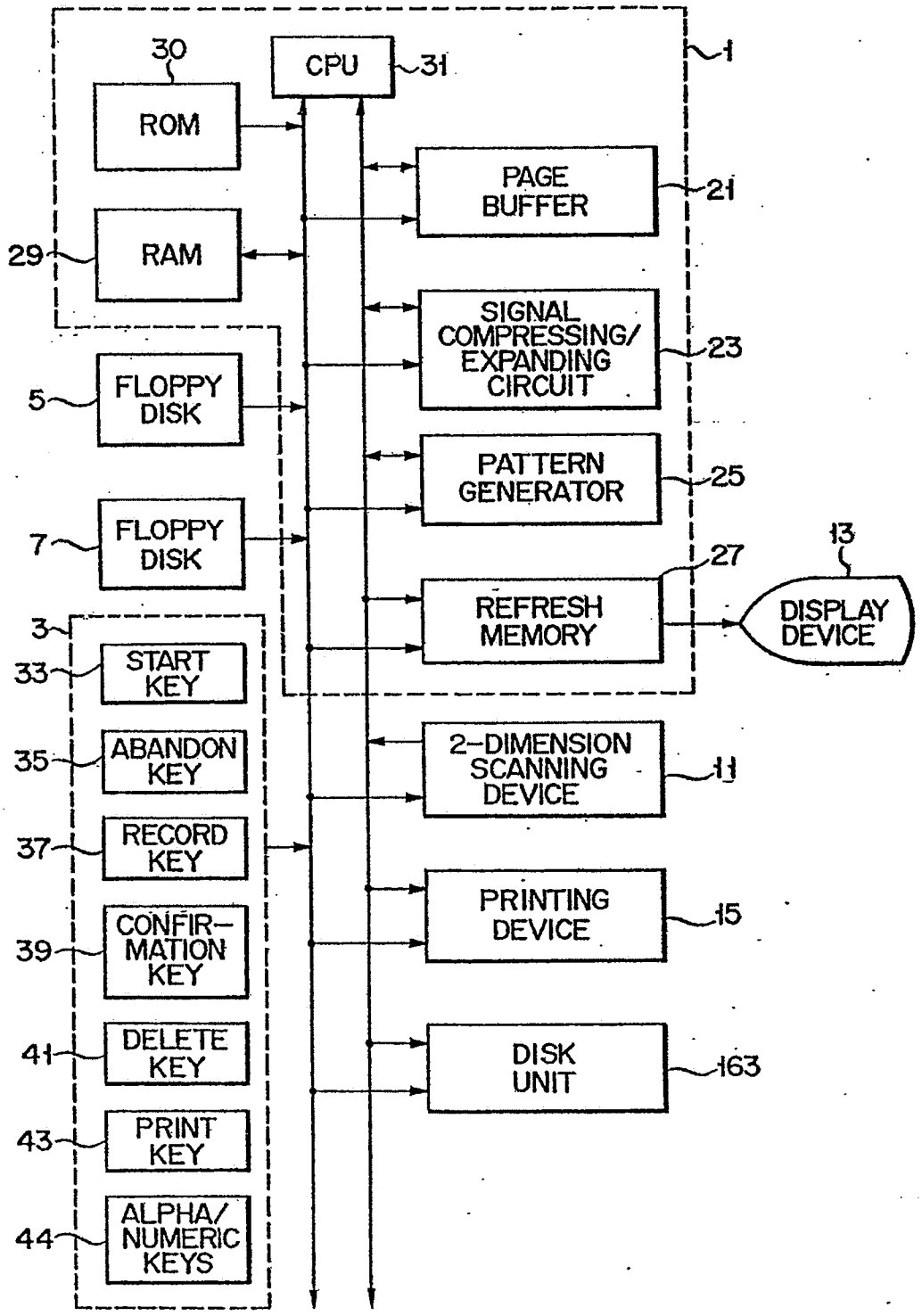


FIG. 11

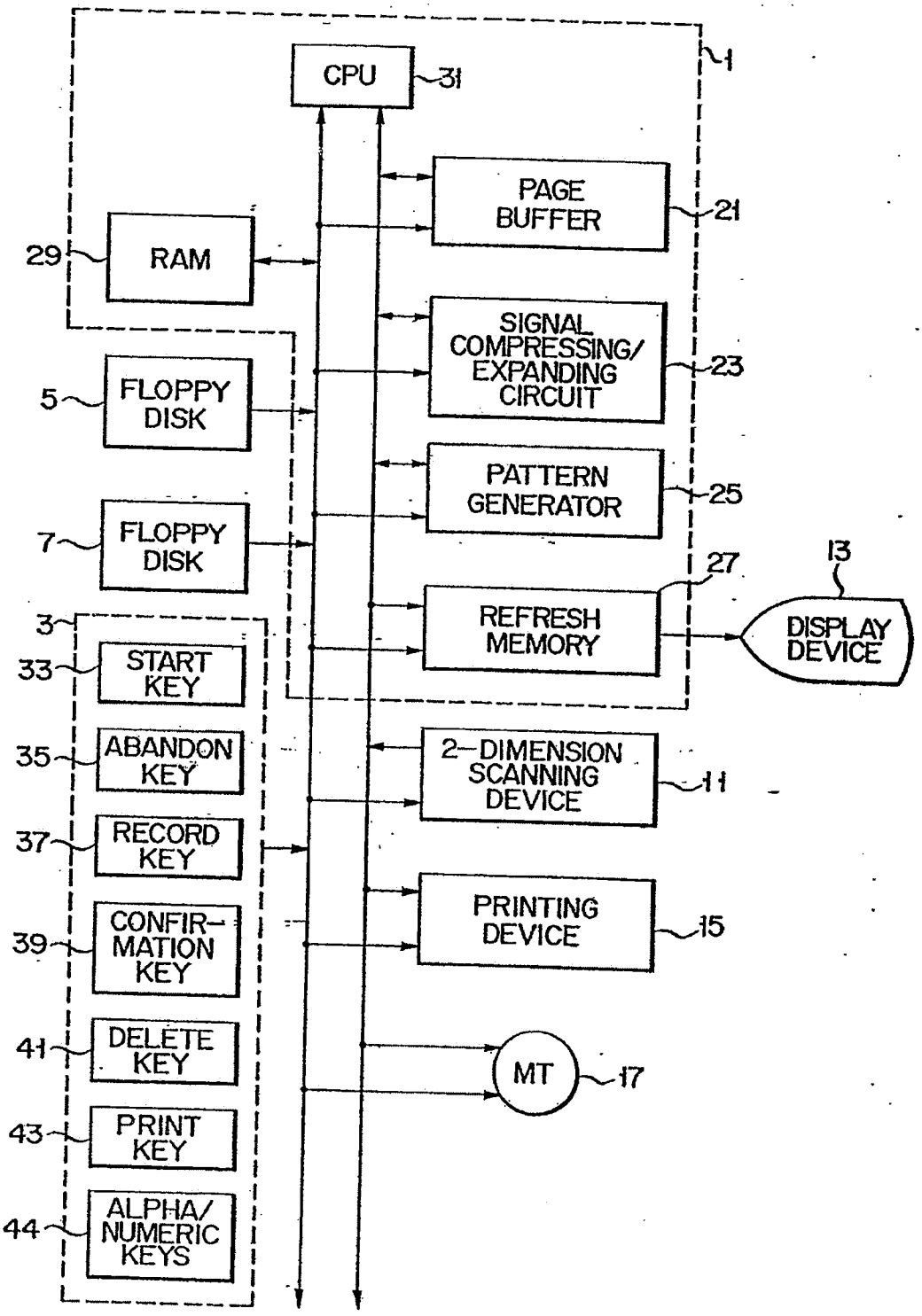
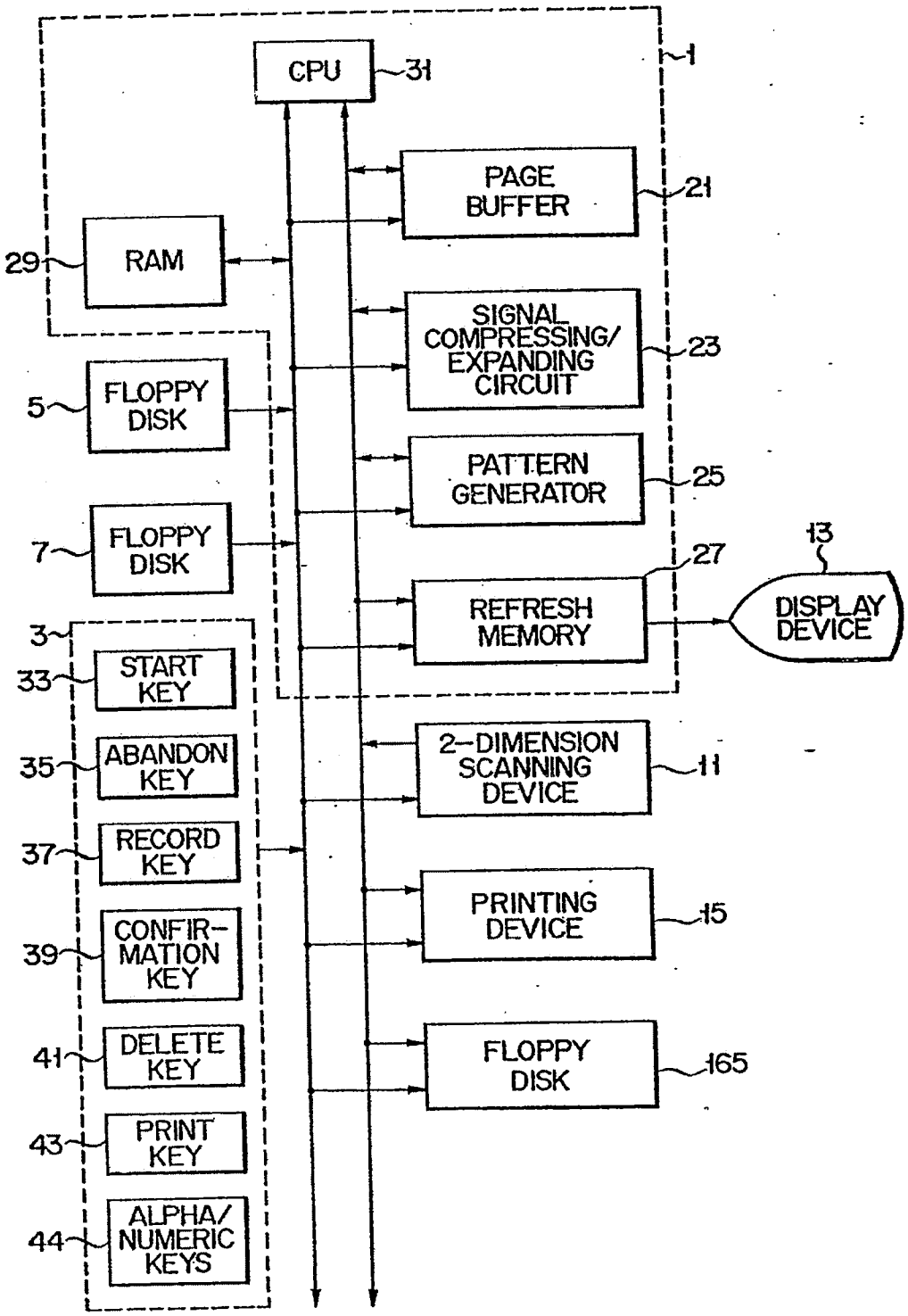

1
CPU
31
PAGE BUFFER
21
29
RAM
SIGNAL COMPRESSING/ EXPANDING CIRCUIT
23
5
FLOPPY DISK
PATTERN GENERATOR
25
7
FLOPPY DISK
27
13
REFRESH MEMORY
DISPLAY DEVICE
3
33
START KEY
35
ABANDON KEY
2-DIMENSION SCANNING DEVICE
11
37
RECORD KEY
PRINTING DEVICE
15
39
CONFIR-MATION KEY
41
DELETE KEY
MT
17
43
PRINT KEY
44
ALPHA/ NUMERIC KEYS

FIG. 12


CPU
31
1
PAGE BUFFER
21
29
RAM
SIGNAL COMPRESSING/ EXPANDING CIRCUIT
23
5
FLOPPY DISK
PATTERN GENERATOR
25
7
FLOPPY DISK
13
27
REFRESH MEMORY
DISPLAY DEVICE
3
33
START KEY
35
ABANDON KEY
2-DIMENSION SCANNING DEVICE
11
37
RECORD KEY
PRINTING DEVICE
15
39
CONFIR-MATION KEY
41
DELETE KEY
FLOPPY DISK
165
43
PRINT KEY
44
ALPHA/ NUMERIC KEYS

0051305

European Patent Office

EUROPEAN SEARCH REPORT

Application number

EP 81 10 9408

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
A	US - A - 4 130 842 (GALLO et al.) * Whole document * --	1-4	G 11 B 27/02 5/008
A	US - A - 3 512 146 (SMITH et al.) * Column 8, line 60 - column 12, line 15 * --	1-4	
A	US - A - 4 041 463 (SLUTZKY et al.) * Column 1, lines 27-31; column 3, line 49 - column 7, line 59 * --	1-4	TECHNICAL FIELDS SEARCHED (Int.Cl.³)
A	JOURNAL OF OPTICS, vol. 11, no. 1, January/February 1980, page 10 Paris, FR. "Système d'impression à laser" * Whole document * --	1-4	G 11 B 5/ 19/ 15/ 27/ H 04 N G 06 K G 06 K 17/
A	PROCEEDINGS OF THE IEEE, vol. 68, no. 7, July 1980, pages 854-867 New York, U.S.A. R. HUNTER et al.: "International digital facsimile coding standards" * Whole document * --	5	CATEGORY OF CITED DOCUMENTS
A	US - A - 3 646 260 (BOLGER) * Column 3, line 9 - column 5, line 23; column 5, line 65 - column 6, line 34 * --	1-4	
	./.		

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P: intermediate document
T: theory or principle underlying the invention
E: earlier patent document, but published on, or after the filing date
D: document cited in the application
L: document cited for other reasons

&: member of the same patent family, corresponding document

X The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	08-02-1982	DAALMANS

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European Patent Office

EUROPEAN SEARCH REPORT

Application number

EP 81 10 9408

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.³)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
PA	DE - A - 3 036 695 (TOKYO SHIBAURA DENKI K.K.) * Page 7, line 22 - page 17, line 19; figures 4-8 * * Priority *	1-6	
	--		
A	FR - A - 2 120 298 (COMPAGNIE GENERALE DE CONSTRUCTIONS TELEPHONIQUES) & DE - A - 2 164 230		
A	FR - A - 2 170 510 (I.B.M.) & GB - A - 1 382 598		TECHNICAL FIELDS SEARCHED (Int. Cl.³)
A	FR - A - 2 079 793 (SOCIETE D'ETUDES ET D'APPLICATIONS TECHNIQUES S.E.A.T.)		

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